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SOME ECONOMIC AND SOCIAL PHASES OF FRENCH AGRICULTURE

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This paper is an attempt to present a brief analysis of those economic and social factors, an understanding of which is necessary for an accurate appraisal of the agricultural tendencies of the French nation.

Population: An economic survey of any important industry of France requires some analysis of her population status. France differs from other leading nations of the world in regard to growth—or rather lack of growth—of population. This difference has a direct bearing upon international phases of her agriculture.

From the standpoint of the world as a whole, one of the pressing economic problems is that of increasing the food supply at a rate proportional to the increase of population. Healthy economic and social conditions demand that a major portion of the civilized inhabitants of the world be substantially fed and sufficiently clothed. This demand calls not only for ever increasing amounts of the products of the soil but for smooth adjustments in their distribution, in order that surplus products may find their way to deficit areas. For surplus producing nations the pressing problem is that of finding profitable markets abroad. For deficit producing nations the task is one of financing the outside purchases through the medium of surplus production in industries other than agriculture.

The agricultural policies of any nation are likely to be influenced by the present and estimated future consumption

demands of that nation for the products of agriculture. One index to future demands is the rate of growth of a nation's population.

The population of France has a tendency to decrease. In this respect France presents a notable exception to the usual. France has on the same territorial area no more people now than she had in 1880—40 years ago. Her increase during the past century does not exceed 30 per cent. During the same period Italy has doubled the number of her inhabitants, while those of the United States have increased by the multiple of 11. Furthermore, France has experienced a noticeable decline during the last 20 years. Much of this latter decline was, of course, due to war losses. Roughly speaking, France lost 1,400,000 men who were directly involved in war operations. In addition to this number the excess of deaths over births among the civil population during the war years account for more than another million decrease.

But this tendency-to-decline status of the population cannot be explained as the effect of war alone. An increase of less than 30 per cent in 100 years are the results of more deeply rooted causes than those directly connected with military conflicts.

Has France reached the "saturation point?" One must infer that she has not, when her density is compared with that of other European countries having no greater natural resources than herself. Such a comparison is given in the table below.

Density of Population Per Square Kilometre (0.386 sq. mi.) of Eleven Countries.[1]

Country	Year	Average number of inhabitants per square kilometre
United States	1920	14
France	1921	71
Denmark	1921	74
Switzerland	1920	94
German Empire	1919	126
Italy	1921	126
British Isles	1921	151
Japan	1920	187
Holland	1920	200
Belgium	1920	245

[1] Annuaire Statistique.

Although seven times as densely populated as the United States, France is not thickly settled when compared to her immediate neighbors. Belgium has three times as many inhabitants per square mile. Holland has nearly as many as Belgium, while the British Isles is twice as thickly populated as is France.

Is the decrease due to migration? Migration is not the answer for her migration is nil. The movement of French people to other lands has never been large, and during the past 10 years it has practically ceased. Likewise is her immigration an insignificant factor, although France now considers herself a nation depending upon immigrant labor. In 1921 there were less than a quarter of a million naturalized citizens and around 1,500,000 resident foreigners within her boundaries.

Whatever the economic causes, the biological result is a low birth rate with its accompanying small families. Below is an analysis of the size or the family for the year 1921.[2]

Number of children per family	Number of families	Per cent
None	1,686,915	14.4
One	3,011,026	25.7
Two	2,557,943	21.9
Three	1,516,043	13.0
Four	880,914	7.5
Five or six	793,185	6.8
Seven or more	331,072	2.8
Not declared	919,559	7.9
All families	11,696,657	100.0

Nearly two-thirds of the families have two children or less. The small sized family, the low birth rate, together with little or no immigration are important direct causes in the lack of growth of population. Back of these direct causes, are social, economic and legal conditions which constitute the basic causes for small families, low birth rate and lack of immigration. It is not within the scope of this study to discuss these basic conditions. The only purpose of presenting a few details on the status of the population is to emphasize the fact that France has a stationary-with-a-tendency-to-decrease

[2] Annuaire Generale de la France et de l'Etranger.

population, and above all to show that this condition is not of a temporary or mere passing state.

It is a condition of long standing and deep seated origins. It is a condition showing little tendency to change.

In many countries the agricultural policy is based on the need of an increased food supply in order to meet the needs of an ever increasing population. One can readily see from the information just submitted that increasing population exerts no pressure on the agricultural policy of France.

The Agricultural Population: France is essentially an agricultural country. In 1911, 50 per cent of her inhabitants were in rural districts and in towns and villages having less than 2,000 inhabitants. But in France as in the United States there is considerable alarm over the "drift" to the city. The extent of this drifting tendency is shown in the following figures:

Relative Decrease in Rural Population—France

Year	Per cent of population	
	Rural	Urban
1790	78	22
1850	75	25
1911	58	42

The predominance of Agriculture as an industry is further brought out by the fact that of all those gainfully employed in 1911 over 40 per cent were engaged in agriculture. The table below gives this comparison:

Division, by occupations, of the French Population Gainfully Employed.[3]

1911

Occupation	Number	Per cent
Agriculture	8,517,000	40.6
Industry	5,746,000	27.5
Commerce	2,053,000	9.8
Transportation	1,543,000	7.3
Public Service	1,292,000	6.2
Domestic Service	929,000	4.4
Liberal professions	550,000	2.6
Mines & Quarries	246,000	1.3
Fisheries	55,000	.3
All	20,931,000	100.0

[3] Annuaire Generale de la France et de l'Etranger.

In a country with a rapidly increasing population like the United States a decrease in the proportion of people living in the country may not be serious. The proportion living in the city may increase while the rural districts are at the same time receiving a healthy increase in absolute numbers. But in a nation with a non-increasing population, an increase in city numbers means an absolute decrease in rural population. In fact, it is the farm that suffers from this decrease in number of inhabitants. It is the rural districts that lose their people. The population status assumes serious proportions because of its direct relation to the welfare of agriculture. That the nation fully appreciates this seriousness is shown by the substantial inducements offered to parents who will assume the obligation of rearing larger-than-usual families. Prizes are presented, marks of honor are bestowed, and government railway and interest rates are reduced to parents with more than the usual number of children.

Farm Labor: In traveling through the rural districts of France, one is struck by the noticeable minority of young and middle aged men on the farms. Of the 8,517,000 gainfully employed in agriculture in 1911, 3,238,000 were women. On all sides one sees old men, women and children carrying the bulk of the work in the fields.

Discussions and writings on the subject have a pessimistic tone. The press carries accounts of the poorer lands being abandoned because of lack of sufficient farm labor at a rate the farmer can afford to pay. There seems to be a strong feeling that the task of tilling the soil is falling to workers who remain on the land because of their unsuitability for other industrial occupations, and that the recruits are not capable of shouldering the responsibility of an increased and improved agriculture. Keen regret is expressed because agriculture is becoming dependent to an increasing extent upon foreign labor.[4] Even though one be inclined to discount a portion of

[4] "An official of the Department of Agriculture, after visiting the naturally fertile district of Limagne, stated in December last that in certain communes a third of the land was lying fallow through lack of farmers, to which a deputy for the district added: 'The land only exists by the labour of the old men, as all the young ones are leaving, and when these old men shall have worked themselves to death, then will the land die too.'"—M. Fierre Caziot, Journee Industrielle, July 20, 1923.

"The situation in at least one-third of France is desperate; in many districts the land is only tilled by old men, women and *foreign hirelings*. The number of

these misgivings, it must be admitted that the absolute decrease in numbers of able bodied workers in so basic an industry as agriculture, is just cause for national alarm.

The average agricultural wages in 1921 was 14.25 francs as compared to 3.35 francs in 1911. During the same period, the value of the franc had diminished to about one-third its par value. Roughly speaking, the French farmer paid 65 cents per day for labor in 1911 and $1.00 per day in 1921—this without board. In general the monthly wages for men with board in 1922 was below 200 francs (around $16.00 per month). This is for the highest skilled labor—that of teamsters. The wages of general laborers run less. The male day laborer who receives food but not lodging seldom receives over 10 francs per day (80 cents) while the women are paid about half that sum.

In 1921 the agricultural worker in France not supplied with food received around $1.00 per day. During the same year the agricultural laborer not supplied with board in the United States received on the average, $1.83 per day. For harvest labor he received $2.79.

The general all around hand in France working by the month received in 1922 with board about 150 francs—between $12.00 and $12.50 for the month. The same class of labor received in the United States something like $30.00 per month—and hard to get at that. On the whole it is safe to conclude that the agricultural wage scale is twice as high in the United States as in France.

In France women workers are common on the farms. They are employed in the stables as well as the fields. Their scale of wages is considerably lower than that of the men. It is not uncommon to find man and wife employed in pairs under the same working agreement. The woman agricultural laborer in France emphasizes the vast difference between the character of agricultural labor conditions in that country as compared with the United States. The difference lies not only in the wage scale, but it also emphasizes the accepted standards of rural life in the two countries. It brings out the additional

*young men is ever becoming smaller, their sole idea being to keep a small shop or find a small situation in the towns. If the supply of situations equalled the demand, tomorrow the country would be drained of three-fourths of its working population."—Quoted from the Economic Review, October 12, 1923.

fact that one country has a distinct agricultural laboring class composed of both sexes while the other country has no such class.

French Agriculture is organized on the basis of a permanent laboring class. The diminution in numbers of the more efficient of this class is the basis of one of the difficult problems which French farmers now face.

The above information is apt to lead one to conclude that farm wages furnish the explanation for labor's scarcity. No doubt the discrepancy between farm and factory pay is one of the explanations. The main problem, however, lies in the development of ways and means whereby the farmer is enabled to pay more. French agricultural practices involve much more hand labor than customarily used in America for performing the same task. Cutting hay with the scythe, raking hay by hand, binding grain by hand, binding straw by hand as it comes from the thresher, are typical of many practices still in common use.

Labor used in the performance of these tasks cannot be highly paid. Their earnings are limited by the products of their labor. Americans may be inclined to dismiss the problem with the suggestion that labor saving machines should displace these practices. Such advice, however, is not generally applicable. Small holdings, long distances between dwellings and fields, small but widely separated fields (strip farming), which practices, welded together by the customs of centuries, make changes difficult.

Without question the agricultural labor conditions in France go a long way in explaining the tendency toward increased livestock production and to the more extensive types of farming.

Size of farms: A discussion of the economic phases of French agriculture would be lacking in fundamental considerations if it did not deal in some measure with the size of farm holdings. Especially is this true from the point of view of comparison with American agriculture because of the wide difference between the size of holdings in America and in France.

The last general agricultural census taken in France was in 1892. Although applying to conditions of 30 years ago, these data have much significance. Habits, customs and practices change much more slowly in the old world than in our own country. In the United States there is a saying that "every farm is for sale." In France it could be said with an equal degree of accuracy as representing a tendency that "no farm is for sale." Although there are many more land transactions since the war than formerly, land changes hands less frequently in France.

"The Merite Agricole" furnishes a good illustration of the tendency toward continuous occupation of the same land by the same family. The "Merite Agricole," an honorary badge, has been awarded by the French Government to farmers whose families have been on the same land for more than a century. Many French families have received this honorary recognition. One farm family is able to trace the connection of its ancestry with the land for a period of 900 years. Two, three, and four hundred years are not uncommon records.

In addition to the last agricultural census report of 1892, the French Government made a special inquiry on "Small Rural Properties" in 1908-1909, which inquiry is valuable in indicating the tendency since 1892.

The table below gives the number of farms classified by size in 1892.

Number and Size of Farms in France 1892.[5]

Size	Number
Less than 1 ha.[6]	2,235,405
1 to 5 hectares	1,829,259
5 to 10 hectares	788,299
10 to 20 hectares	429,407
20 to 30 hectares	189,664
30 " 40 "	92,047
40 " 50 "	53,343
50 " 100 "	52,048
100 " 200 "	22,777
200 " 300 "	6,223
More than 300	4,280
Total	5,702,752

[5] Statistique Agricole, Enquete de 1892.

[6] A hectare—2.47 acres.

Over four-fifths of the total number of holdings were less than 10 hectares (24.7 acres) in size. Less than two per cent exceeded 100 hectares (247 acres) in size. Nearly half of the total number of holdings were less than 1 hectare in size. It should be explained that the large number of holdings of this size are not, strictly speaking, agricultural holdings, but market gardens, small vineyards and for the most part plots attached to cottages of farm laborers.

During the years 1882 to 1892 the size of holdings changed but slightly. This same tendency continued during the next decade. The investigation of 1908-1909 shows that small holdings had increased during the preceding 20 years.

It is interesting to compare the size of holdings in France with the average size of the farms in the United States. Whereas fully four-fifths of the farms in France are of 10 hectares or less, the bulk of the farms in the United States are between 20 and 175 acres. This difference in size is one of the factors which emphasizes the difference in practices employed. France is a land of small farms well tilled. This fact goes a long way in explaining how a country one-fourteenth the size of the United States is able to grow the food for a population one-third as great.

Land values: The situation concerning land values has changed fundamentally since the war. Land sold much more readily in 1919 with an average increase in values from 25 to 50 per cent and in exceptional cases from 58 to 100 per cent.

However, the increase in land values has not kept pace with the depreciation of the purchasing power of the money. There are a number of reasons why this is so.

While value of capital in land has increased from 30 to 50 per cent, the value of working capital has increased 200 per cent. A farm worth 1,300 francs per hectare calls for a working capital of 1,800 francs per hectare and in the case of market gardening 3,000 francs per hectare. It will be seen that land capital has become a mere adjunct of working capital in the business of agriculture in France.

The taxation on land values is heavier than on personality. Taxation often absorbs the whole income of forest lands. On large estates, it amounts on the average to 13.28 per cent of the

total income. On the other hand, personality pays taxes at the rate of 4 per cent on the income.

High land values and low rents make land a safe but unprofitable form of investment to the capitalist or to the absent landlord, even though it still remain a profitable investment to the owner who farms his own acres.

As a result of these conditions, there has been a marked increase in peasant proprietorship since the war. In a majority of cases the purchasers have been actual tillers of the soil, and to a great extent former tenants.

The devastated area: One-thirteenth part of the total area of France proper was invaded during the War. The devastated section was far more important agriculturally and industrially than is indicated by its proportion to total area. Its relative importance is brought out by the fact that the invaded territory paid one-fifth of the aggregate taxes before the war. The official figures place the number of buildings destroyed or suffering important damage at 741,993, and the number of factories destroyed at 22,900. In addition, 8,169,991 acres of land were torn up, over half of which—4,752,917 acres—consisted of cultivated fields.

Land reconstruction work is given additional impetus by the action of the government in granting a bounty of 200 francs for each hectare cultivated in wheat and 80 francs for each hectare growing rye. The remuneration applies only to devastated areas.[7] The government budget[8] for the fiscal year 1921 carried an item of 67,000,000 francs for payment of the above remunerations. The rapidity of agricultural reconstruction work is also due in a large measure to the policy of giving preferences in order of time to the needs of agriculture and to other productive industries. It is this policy that explains the reason why the reconstruction of agricultural villages is well along toward completion, while some of the larger towns are in the initial stages of rebuilding.

In traveling through the war zone, one is struck by the fact that the work on the rebuilding of an entire village will be in progress at the same time, rather than by separate properties. Inquiry shows this to be the result of the villagers forming

[7] Law of August 9, 1920.
[8] Law of July 16, 1921.

themselves into a cooperative building association and letting contracts at one time covering the rebuilding of the entire village. This plan has the added advantage of producing harmonious types of architecture employed.

Observation gained by traveling through the war zone leads one to believe that practically all the good lands have been restored to cultivation. Miles of unfilled trenches and acres of standing wire were still to be encountered in the summer of 1923, but practically all trenches and wire remains on poor lands agriculturally. Much of the present unrestored areas will be unrestored 10 years hence. Where the damages of war exceed the value of the land, nature is the only reconstruction agency that can be economically employed. Nature works slowly.

The work of replacing livestock in the devastated area has not gone forward as rapidly as has the clearing of the land and the construction of buildings. This result is to be expected, however, since it is necessary to put the land in usable form and construct farm buildings before livestock can be properly maintained.

Agricultural thrift: Only a superficial understanding of French agriculture can be had, unless one appreciated the thriftiness of the French peasant. The proverbial thrift of the French farmer is so well known as to need no elaboration except by way of a reminder. His universal ambition is to own a home and a piece of land. The tender care of his acres far surpasses that usually practiced in our own country. In France the economic goal is a high product per acre which is obtained at the expense of much labor. In the United States the goal is a high product per man which is usually obtained at the expense of more acres. These practices have little in common. Yet without doubt, each is best suited to its economic environment.

One who observes farming in many lands is led to believe that agriculture is universally an occupation calling for long hours and permitting of few holidays. Yet in few countries do the farmers apply themselves as energetically as does the French peasant. His application to his land is limited only by his physical endurance.

Every member of his family is involved in the carrying on of the work of the farm. Women and children are employed in the fields and at tasks requiring manual labor to an extent greater than that sanctioned by the accepted farm standard of living in America.

As compared with the United States, France is a nation of small incomes. Income tax returns for the year 1920 show that the yearly incomes of 6,000 francs and above were divided as follows:[9]

Number of incomes	Size of incomes Francs	Dollars
592,401	6,000— 20,000	420— 1,400
140,443	20,000— 50,000	1,400— 3,500
31,015	50,000—100,000	3,500— 7,000
16,678	100,000—500,000	7,000—35,000
838	above—500,000	above—35,000

781,375 persons with incomes above 6,000 francs.

The franc in 1920 had an average value of 7 cents. Hence, in a nation of nearly 40,000,000 people, less than 500,000 people had an income in excess of 50,000 francs per year—$3,500.

The significant point is not the smallness of the income, but the known ability to save a portion of so small an income.

Saving bank deposits is only one of a number of channels for savings and investments. The number of accounts, however, may be taken as an indication of the ability to save. At the beginning of 1922 two persons out of every five men, women, and children in France maintained saving accounts. Although the vast majority of accounts contain less than 500 francs—between $30.00 and $40.00 in 1923—the number of accounts and the tendency which this number indicates is impressive.

Any nation competing with the agricultural products of France must reckon with the love of the French peasant for his land, his untiring application to it, and his ability to save—three characteristics of a worthy competitor.

[9] Annuaire Statistique, 1922.

SHIFTS IN RURAL POPULATION AS INDICATED BY CHANGES IN NUMBERS OF HOUSES IN TOMPKINS COUNTY, NEW YORK[1]

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There has been much interest in recent years in the shifting of population between open country and city. Population also shifts considerably even in rural territory. An indication of the changes within rural territory may be found by comparing the number and location of houses a number of years ago with those at present in existence.

In 1920 the writer assisted in a soil survey of Tompkins County, New York, by the Bureau of Soils, U. S. Department of Agriculture, in cooperation with the New York State College of Agriculture at Cornell University. Maps prepared by the United States Geological Survey were used in making the survey. These maps indicate the location of buildings and roads about twenty-five years ago, the various quadrangles comprising the area having been surveyed at different times during the period from 1893 to 1899. The cultural features of these maps were brought up to date during the progress of the soil survey. Roads were corrected where their course had been changed, and old houses which had burned down, had been removed, or which had reached such a state of decay that future occupancy was out of the question, were removed from the map, and houses which had been erected since the earlier survey were indicated on the map. There is, of course, no way of knowing how completely the houses were indicated in the earlier survey, nor what was their state of preservation at that time. In 1920 many vacant houses were found on the map. Some of these had apparently been unoccupied only a relatively short time, others had been vacant a long time.

[1] The writer expresses his obligation to Mr. F. B. Howe, of Cornell University, and Mr. H. G. Lewis, of the Bureau of Soils, United States Department of Agriculture, who were in charge of the soil survey of Tompkins County in 1920, for helpful discussion and suggestions.

Tompkins County is a region of hills and valleys. Cayuga Lake with an elevation of about 400 feet extends from the northwest corner nearly to the center of the county, while there are hills reaching over 2,000 feet in elevation in Newfield and Enfield, over 1,900 feet in Danby and Caroline, and Dryden, and over 1,600 feet in Groton.

The northwestern towns of Ulysses, Lansing and Ithaca which border Cayuga Lake, range in elevation from less than 400 feet to over 1,300 feet in Ulysses, over 1,400 feet in Ithaca and over 1,200 feet in Lansing. These three towns comprise the best agricultural land in the county. Much of the land at elevations greater than 1,000 feet is of thin glacial till over shale rock and is very low in calcium. In many cases it is poorly drained. The soils at the lower levels in the northern township are much deeper and in places are fairly well supplied with calcium. Generally speaking, the villages are in the valleys.

TABLE I.—CHANGES IN NUMBER AND LOCATION OF HOUSES IN PART OF TOMPKINS COUNTY, NEW YORK, BETWEEN 1893-99 AND 1920[1]

Townships in which the count was made	Approximate area covered by the count	Houses Taken Off and Put on Map								
		In Open Country			In Hamlets and Villages			Total		
	sq. mi.	Off	On	Net change	Off	On	Net change	Off	On	Net change
Groton	51.3	32	16	−16	8	29	+21	40	45	+5
Ithaca (outside city limits)	17.9	10	26	+16	2	9	+7	12	35	+23
Lansing	63.2	29	24	−5	3	53	+50	32	77	+45
Dryden	33.5	42	20	−22	4	31	+27	46	51	+5
Ulysses	34.0	19	12	−7	5	11	+6	24	23	−1
Caroline	88.6	50	22	−28	7	26	+19	57	48	−9
Danby	56.7	38	21	−17	3	9	+6	41	30	−11
Newfield	61.1	60	33	−27	0	10	+10	60	43	−17
Enfield	38.4	45	13	−32	1	6	+5	46	19	−27
Total	444.7	325	187	−138	33	184	+151	358	371	+13

The changes that had taken place in the disappearance or relocation of houses in the parts of the various townships where counts were made are shown in Table I. In the open country there was a decrease in the number of houses in all the townships except Ithaca. The increase shown in Ithaca would have been greater had not additional territory been included within the city boundaries after 1910. In hamlets and villages, however, there was an increase which really was somewhat greater than that

[1] The base maps used were from the United States Geological Survey as follows: Ithaca Quadrangle (1893); Moravia Quadrangle (1896); Dryden Quadrangle (1898); and Genoa Quadrangle (1899).

shown, because of the necessity of blocking in on the map the buildings in a few densely settled village streets, so that the identity of individual houses was lost.

If all the territory is considered together, it is apparent that there has been a net increase in the number of houses in four of the townships and a decrease in number in five of them. Taken in connection with the change in population in these townships (Table II), the areas having the greatest decrease in population also had the greatest decrease in the number of houses.

TABLE II.—POPULATION OF TOMPKINS COUNTY, NEW YORK
(U. S. CENSUS)

Township	1920	1910	1900	1890	Per cent change 1890 to 1920
Groton	4,122	3,289	3,564	3,572	+15.4
Ithaca (outside city limits)	1,480*	1,288	1,516	1,364	+8.5
Lansing	2,380	2,676	2,550	2,505	−5.0
Dryden	3,186	3,590	3,785	4,043	−21.2
Ulysses	2,105	2,612	2,776	2,954	−28.7
Caroline	1,542	1,646	1,938	2,092	−26.3
Danby	1,143	1,235	1,449	1,707	−33.2
Newfield	1,456	1,509	1,902	2,214	−34.2
Enfield	867	1,000	1,214	1,393	−37.8
Total	18,281	18,845	20,694	21,844	−16.3

The greatest decrease in population and in number of houses is in the region of poor soil. There is a very noticeable inverse relation between the disappearance of houses from the map and the productive character of the soil, taken of course in relation to its topographic characteristics.

The observations outlined above are given with the hope that investigators who are interested in the definite relationships that undoubtedly exist between social phenomena and the physical environment of rural people, may develop, in greater detail, the use of similar material and may see more clearly the interdependence between such apparently diverse fields as sociology and soil science.

The limitations on making such studies quantitatively are, first, the uncertainty as to how carefully and uniformly the cultural features may be represented on the maps of different periods, and second, the lack of information as to how many of the houses are now, and were in earlier years, uninhabited. In spite of these limitations, it seems like a field worth cultivating.

* Part of Ithaca town annexed to Ithaca city since 1910.

INCREASES AND DECREASES IN THE OPEN COUNTRY POPULATION OF OHIO, 1910-1920

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To the person who casually scans the census report for changes in population during the past decade the fact of rural decrease seems at first a simple matter. Thus, if he is examining the fourteenth census with reference to Ohio, he notes that the rural population has declined both relatively and absolutely. A little computation shows that of the two classes of places which go to make up what is known in the census as "rural territory," the incorporated villages of less than 2,500 declined relatively but increased absolutely; while all "other rural territory" decreased relatively from 34.6 per cent to 27.9 per cent of the total population and absolutely by 2.4 per cent.

TABLE I.—INCREASE AND DECREASE IN STATE, URBAN AND RURAL POPULATION, 1910-1920

Class of Places	1920		1910		Increase 1910-20	
	Number	%	Number	%	Number	%
State	5,759,394	100.0	4,767,121	100.0	992,273	20.8
Urban	3,677,136	63.8	2,665,143	55.9	1,011,993	38.0
Rural	2,082,258	36.2	2,101,978	44.1	—19,720	—0.9
Incorporated places under 2,500 population	472,754	8.2	452,030	9.5	20,724	4.6
Other rural territory	1,609,504	27.9	1,649,948	34.6	—40,444	—2.4
Unincorporated villages	299,015	5.2	267,837	5.6	31,178	11.6
Agricultural and other open country population	1,310,489	22.7	1,382,111	29.0	—71,622	—5.2
Farm population	1,139,329	19.8				

The matter may be easily dropped at this point. However, a few moment's reflection regarding "other rural territory" which includes both unincorporated villages and open country causes numerous questions to arise. Two of these, only, will be dealt with in this paper: (1) the geographic distribution by townships of the increases and decreases in "other rural territory," the algebraic sum of which represents the 2.4 per cent decrease in the population of said territory, and (2) the component factors involved in these increases and decreases.

There are in Ohio, outside of Cuyahoga and Hamilton counties and a number of townships which are entirely incorporated as village and urban territory, 1,317 townships. It is these townships minus all incorporated territory therein

which we shall study. Cuyahoga and Hamilton counties are not included for two reasons. In the former county a large percentage of the townships are coextensive with villages and cities. In both counties the high degree of urbanization (Cleveland & Cincinnati are located in these counties) renders the statistics of change undependable on a township basis. The increases and decreases in the population of these 1,317 townships from 1910 to 1920 is presented in Table II.

TABLE II.—TOWNSHIPS INCREASES AND DECREASES IN OPEN COUNTRY POPULATION, 1910-20

Class	Number Townships	%
Townships showing increases in open country population	315	23.9
Townships showing decreases in open country population	998	75.8
Townships showing no change in open country population	4	.3
Total	1,317	100.0

By grouping the 1,313 townships which showed change, according to extent of increase or decrease (Table III), it will be seen that in a majority of cases the changes per township were not great.

TABLE III.—TOWNSHIPS GROUPED ACCORDING TO EXTENT OF INCREASE OR DECREASE IN OPEN COUNTRY POPULATION, 1900-1920

Population Change	Townships Showing Increases Number	%	Townships Showing Decreases Number	%
Total	315	100.0	998	100.0
Under 26 persons	66	21.0	91	9.1
26— 75 "	91	28.9	279	28.0
76— 125 "	37	11.8	267	26.8
126— 175 "	19	6.1	166	16.6
176— 225 "	8	2.5	72	7.2
226— 275 "	13	4.1	41	4.1
276— 325 "	8	2.5	19	1.9
326— 375 "	4	1.3	9	.9
375— 425 "	8	2.5	11	1.1
426— 475 "	6	1.9	4	.4
476— 525 "	5	1.6	8	.8
526— 575 "	3	1.0	9	.9
576— 625 "	6	1.9	0	—
626— 675 "	2	.6	1	.1
676— 725 "	5	1.6	4	.4
726— 775 "	2	.6	3	.3
776— 825 "	2	.6	2	.2
826— 875 "	1	.3	1	.1
876— 925 "	2	.6	4	.4
926— 975 "	1	.3	1	.1
976—1025 "	4	1.3	2	.2
Over1025 "	22	7.0	4	.4

The accompanying maps show the distribution of these townships throughout the State.

In considering the component factors involved in the population changes of the so-called "other rural territory," let us begin with the fact that this class decreased 40,444 persons or

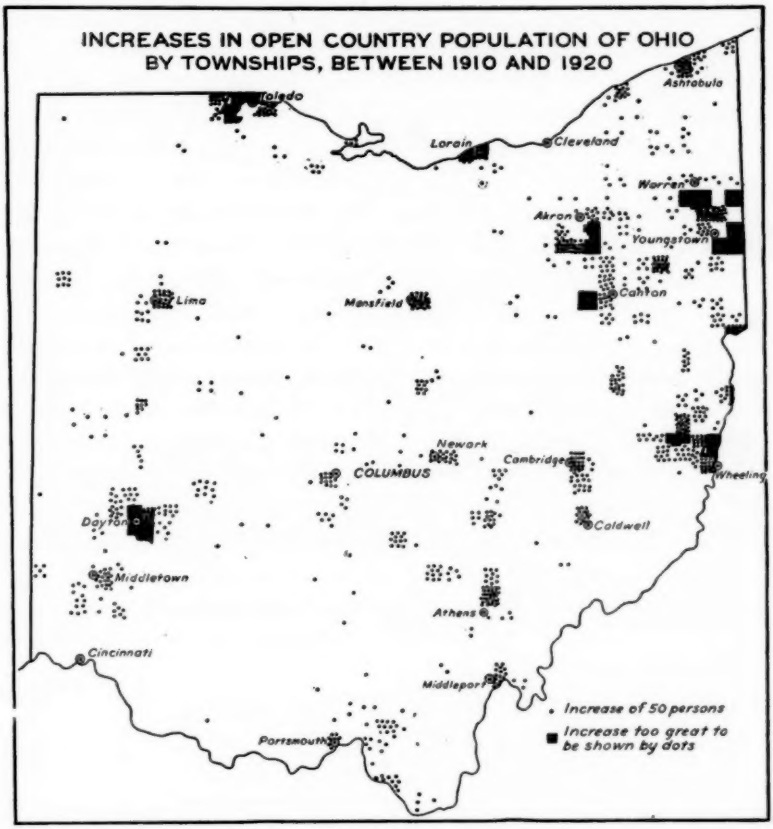
2.4 per cent. This class is composed mainly of two elements, the unincorporated villages and hamlets and the true open country population which is chiefly agricultural. Because of the impossibility of segregating these elements on a township basis they are treated together on the map. Table I, however, shows that for the State as a whole the unincorporated villages increased 31,178 or 11.6 per cent, while the true open country

DECREASES IN OPEN COUNTRY POPULATION OF OHIO
BY TOWNSHIPS, BETWEEN 1910 AND 1920
• Decrease of 50 persons
■ Decrease too great to be shown by dots

population declined 71,622 or 5.2 per cent. This is the only absolute decrease in any class of places between 1910 and 1920.

Upon examining these changes by counties it is a little startling to learn that 37,359 of the 40,444 decrease in "other rural territory" occurred in Cuyahoga and Hamilton counties. These counties have an urban population of more than 90 per

cent of their total. A study of the figures for these two counties indicates that incorporation of open country suburbs and villages has been chiefly responsible for the decrease, in spite of the 130.3 per cent increase in unincorporated villages. Evidently the so-called open country population is constantly swelled by a considerable quota of real city dwellers who hover just without the incorporated limits.



Dropping out the decreases for Cuyahoga and Hamilton counties we find that the decrease of the population in the unincorporated territory of the remaining 86 counties, the counties which we have mapped, is reduced to 3,085. This sum viewed geographically represents the algebraic sum of the increases in the 315 townships showing increases and the de-

creases of the 998 townships showing decreases. Or, viewed as unincorporated village and open country, it represents the algebraic sum of the increases of the former and the decreases of the latter.

Considering the latter view first, we find, after removing the respective elements for Cuyahoga and Hamilton counties, that for the remaining 86 counties the unincorporated villages increased 17,355 and that in the true open country the decrease was 20,440. This latter figure is due chiefly, no doubt, to a decline in the farm population, for the 1920 census plus computation shows that the farmers in rural territory in Ohio constituted 86.5 per cent of the total open country population. The percentage is a trifle high, however, for some of these farmers dwelt in the villages. In the 86 counties in question there were 13,844 fewer farms in 1920 than in 1910, making a loss of 1.4 persons for each farm lost. Now the nature of agriculture is such that it is probable that in the great majority of cases the loss of a farm means also the loss of a family to the country. There has seemingly been a slight decrease in the rural birth rate in Ohio since 1910, also, without a corresponding decrease in the death rate. Hence, it seems probable that the decline in open country population due to these two factors has been considerably offset by an increase in the number of open country dwellers who cannot qualify as farmers.

TABLE IV.—CAUSES OF INCREASES AND DECREASES BY TOWNSHIPS TENTATIVELY ASSIGNED

Causes	Number Townships	%
Increases	315	100.0
Moderate shift in agricultural, unincorporated village and other open country population	224	71.1
Expansion of cities without incorporation	63	20.0
Changes in mining population	17	5.4
Decline of seven villages formerly incorporated	7	2.2
Unexplained	4	1.3
Decreases	998	100.0
Moderate shift in agricultural, unincorporated village and other open country population	943	94.5
Incorporation of 58 villages	21	2.1
Incorporation of large cities	13	1.3
Changes in mining population	9	0.9
Unexplained	12	1.2

Accurate explanation of the areas of marked increase and decrease would involve a knowledge of the causes of change in

each township. Such is not here possible. It may be noted, however, that while these areas are widely distributed over the State, they fall into three general groups which in a measure suggest their own explanation:

1. Townships immediately contiguous to large and rapidly growing cities. Here both incorporation of new territory formerly classed as rural, and expansion into rural territory without incorporation are common.

2. Townships in sections where mining is the chief industry and where population shifts are frequent due to changes in the industry. Particularly in such areas where there has been only slight change in number of farms can we assign the cause to mining.

3. Townships in which open country villages have been incorporated, or in which villages have declined and lost incorporation during the decade. These may be determined with a fair degree of accuracy from the census.

Now it is probably fairly safe to assume that in townships where the change is relatively small and uniform throughout a group of townships such change is due to a complex of changes in the agricultural and unincorporated village populations. There has been a decrease in the number of farms in all counties but six, and in these the increase is slight. While there is no noticeable correlation between the decrease in rural population and the decrease in number of farms by counties, it is probable that there would be if the population of all villages were segregated.

THE STATISTICAL MEASUREMENT OF THE ELASTICITY OF DEMAND FOR BEEF [1]

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Both in technical discussions of value and in the practical workings of our price-making system, one factor which constantly and significantly presents itself concerns the character of the demand schedule or so-called "elasticity of demand." There is hardly a text-book on economics in existence which does not devote a good deal of space to the exposition of the part played by this factor in price determination under both free competition and monopoly conditions. Such discussions, however, are merely *qualitative* in character. In so far as actual illustrations are introduced in the exposition they are merely for illustrative purposes, and are simply hypothetical figures chosen arbitrarily by the given writer.

Excellent as this may be, it is not enough. In a great variety of the situations which develop in the actual working of our price-organized society it becomes necessary or at least highly desirable that the business man, the official executive, or the legislator should be able to arrive at some *quantitative* measure of the elasticity of demand. Intelligent action or a correct appraisal of the probable effect of a given course can be arrived at only by knowing the intensity of effective demand which the consuming public exerts at varying levels of price.

Two illustrations will suffice. The trader who buys cotton or other staple commodities for resale in a future market must have the safety of any given course determined by a shrewd knowledge of the tenacity with which the public follow a rising market, or the extent of downward revision in the price basis which will be necessary in view of increased abundance of a given product. One of the most striking cases of this sort comes to mind in connection with co-operative

[1] The author is indebted to Mr. Georges M. Weber for preliminary statistical experimentations, and to Miss Arcadia D. Near, Mr. Sheldon B. Akers, and Mr. Jerome T. Ludlow for performing the many computations in connection with the immediate preparation of this study. Dr. E. G. Nourse read the manuscript and made valuable suggestions.

organizations which centralize the marketing of a considerable proportion of some agricultural product of highly seasonal production. Supply being absolutely fixed for some months in advance, the whole determination of their price policy rests upon their quantitative estimates of the absorbtive capacity of their market at every price differential of a cent or fraction of a cent up or down the possible range of commercial price. Long experience has developed some degree of expertness, and varying degrees of individual shrewdness have enabled particular operators to be guided quite cannily by what they call "the feel of the market." A few of the more ingenious have resorted to empirical methods such as questionnaires to the trade, but a scientific approach to the problem becomes increasingly important with every refinement of business organization or every step toward greater concentration of selling organizations.

A second illustration may well be taken from the field of tariff making and its effect upon market prices. Both the possibility of effectiveness and the economic wisdom or social desirability of adding or removing any specific amount from a given tariff rate must come back to our ability to measure with reasonable accuracy the reaction which the consuming public will make to any given pressure either upward or downward upon the existing level of prices.

The Effect of a Tax on the Price of a Commodity

It is with this latter field of price investigation that the present paper will be chiefly concerned. The writer's attention having been directed to the problem of the effect of a tariff on beef, he has tried to show how the accepted general solution which is provided by economic theory may be made definite and concrete through the application of a statistical technique which is connected chiefly with the name of Professor Henry Ludwell Moore, of Columbia University. The results are offered as a study of method without particular regard to its implications to the tariff problem as such.[2]

[2] This problem arose in connection with a study of the tariff and the beef industry by Mr. Lynn R. Edminster of the Institute of Economics. Most of the material used in the present article will subsequently appear in a publication of the Institute.

The problem may be stated more definitely as follows: Suppose that the tariff on an important commodity—say, beef—is increased by one cent per pound. By how much will the tax raise the price paid by the consumer? What will be its effect on consumption? On imports? On the profits of the cattle industry?

These, as everybody knows, are questions of recurrent interest at nearly every Presidential election. One would expect, therefore, that professional economists would be in a position to provide reliable *quantitative* answers to these questions. This, however, is far from being the case. In the present state of our knowledge, only incomplete, more or less hesitant, answers are possible.

This condition is to be deplored, because the methods which are commonly employed in attaching these problems are invalid. As an example, take the question of the effect of the tariff on only one factor—the price of the commodity. The popular method of deriving an answer to this question consists of drawing up tables or graphs showing that prices, after the imposition of former tariffs, have risen (or fallen). Of course, this method proves nothing with respect to the effect of the tariff on prices, because it does not eliminate the other causes which have contributed to the price changes. What we desire to know is not how much higher the price will be *after* the imposition of a tariff than it was *before*, but how much of the increase is due to the tariff, and how much to other causes. This is a problem which can not be solved by "common sense," or "practical" methods; for, as Edgeworth put it, it is "too complicated for the unaided intellect to deal with." Recourse must be had to analytical methods. We therefore turn for guidance to economic theory.

The Solution Provided by Economic Theory

The teachings of economic theory relative to the effect of a tax on the price of the taxed commodity are very definite, and point the way to a solution of this problem. They may be stated as follows:[3]

[3] Cf. Pigou, A. C.—The Known and Unknown in Mr. Chamberlain's Policy, Fortnightly Review, Jan., 1904, p. 44.

(1) The more urgent our demand for the taxed commodity, that is, the more "necessary" the commodity is to us, the more nearly will the price rise to the full amount of the tax.

(2) The greater the increase in the quantity of the commodity offered in our market from home (untaxed) sources in consequence of a given price change, the less will the price change be.

(3) The greater the change in the quantity offered from the taxed sources, the greater will the rise be.

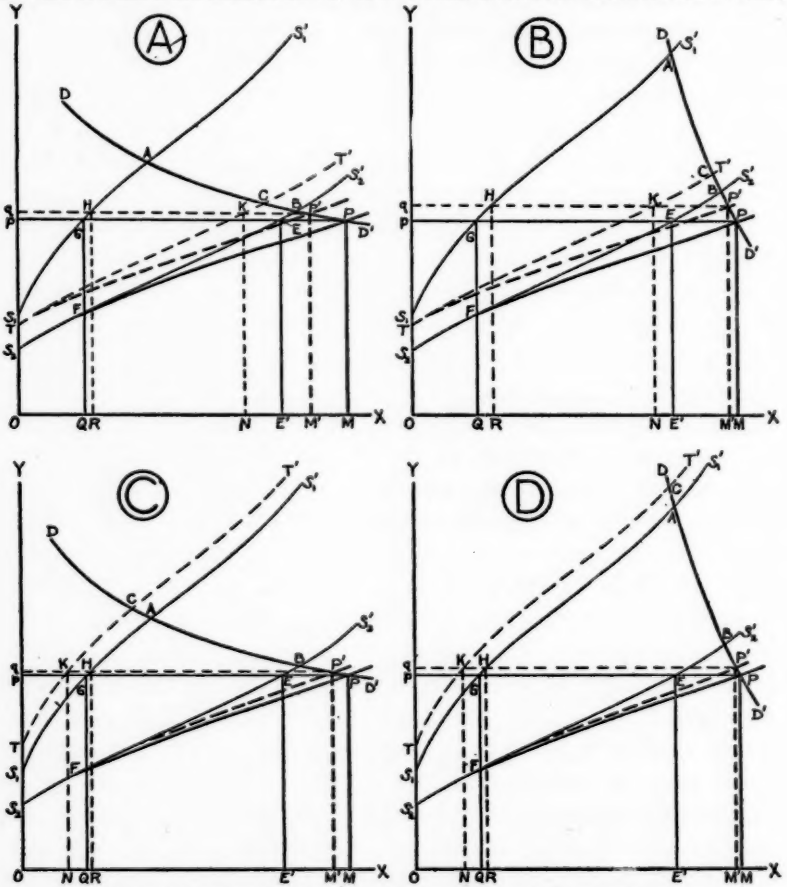
But the urgency of our demand for a commodity is measured by the coefficient of the elasticity of demand. Thus, if the commodity is very "necessary" to us, an increase in its price of one per cent will not cause us to reduce our demand by one per cent, but by something *less* than one per cent. The ratio between the percentage change in the quantity demanded and the corresponding percentage change in price (i. e., the coefficient of the elasticity of demand) is numerically less than one, and the demand is said to be *inelastic.* On the other hand, if the commodity is not so very "necessary" to us, if it is one, for example, for which many substitutes can easily be found, then an increase in its price of one per cent will cause us to reduce our demand by *more* than one per cent. The ratio between the percentage change in the quantity demanded and the corresponding percentage change in price (i. e., the coefficient of elasticity) is greater than one, and the demand is said to be *elastic.* Similarly, the change in the quantity supplied in the market in consequence of a given price change, is measured by the magnitude of the coefficient of the elasticity of supply. If the coefficient is greater than one the supply is elastic, and if it is less than one the supply is inelastic. Hence the foregoing three propositions may be summarized as follows: "Other things being equal, when one source of supply is taxed and the other left free, the rise of price will be greater, the greater are the output and elasticity of the taxed source relatively to the untaxed source." [4]

The validity of this conclusion may, perhaps, be made more obvious by reference to the four cases of Figure 1. Consider

[4] Pigou, A. C., Economics of Welfare, 1920, p. 942.

first Case A, which is designed to show the effect of a tax when it is levied on the elastic source of supply, and when the demand for the commodity is elastic. Let the demand curve be given by DD'. Let there be two sources of supply, 1 and 2. (One of these sources may be foreign and the other domestic, or both may be foreign.)[5] Let $S_1S'_1$ be the com-

FIGURE 1. THE DISTURBANCE OF THE CONDITIONS OF SUPPLY BY A TAX.



Case (A): Tax levied on elastic supply, demand elastic.
Case (B): Tax levied on elastic supply, demand inelastic.
Case (C): Tax levied on inelastic supply demand elastic.
Case (D): Tax levied on inelastic supply, demand inelastic.

[5] The assumption of only two sources of supply, one relatively more elastic than the other, is made simply for convenience in exposition. The conclusion can be extended to cover any number of sources of supply.

paratively inelastic supply, and let $S_2S'_2$ be the comparatively elastic supply. If the supply from source 1 were the only one available, the price would be given by the distance that A is above the X-axis. If the supply from source 2 were the only one available, the price would be given by the distance that B is above the X-axis. But both sources of supply are available at the same time. The price will, therefore, depend upon the point where the *aggregated* supply curve crosses the demand curve. The aggregated supply curve may be derived from the supply curves $S_1S'_1$ and $S_2S'_2$ by adding, for each price, the amounts supplied by both sources at that price, and taking this sum as the abscissa of the aggregated curve; the ordinate as before representing price.[6] Thus, when the price is Op, the amount supplied by source 1 is pG and the amount supplied by source 2 is pE; the amount supplied by *both* sources is pG + pE = pP. The aggregated supply curve, S_2FP, crosses the demand curve DD′ at P. The market price is, therefore, PM; the amount supplied by source 1, OQ; the amount supplied by source 2, OE′; and the total amount supplied and demanded is OQ + OE′ or OM.

Now let a tax of S_2T units be laid on the (foreign) supply $S_2S'_2$. The supply curve of source 2 becomes TT′, and new aggregated supply curve eventually becomes TP′. The latter crosses the demand curve DD′ at P′. The price rises, as a result of the tax, from PM to P′M′, or by pq. The total consumption is decreased from OM to OM′ or by M′M. The supply from the taxed source is reduced from OE′ to ON, or by NE′, but the supply from the untaxed source is *increased* from OQ to OR, or by QR. The other effects of the tax, such as, for instance, the changes in the profits of the producers, may also be conveniently studied by means of this diagram. For the purposes of this memoir, however, we shall concentrate our attention on the effect of the tariff on prices. We have just seen that the increase in price is measured by pq.

[6] In constructing the aggregated supply curve, the assumption is made, for convenience in exposition, that the quantity produced in source 1 has no effect on the supply schedule of source 2. Cf. Pigou, A. C., Economics of Welfare, p. 939.

In Case B the conditions of supply are the same as in Case A, but the demand is assumed to be inelastic. It will be seen that the more inelastic the demand, the greater the price change, other things remaining equal.

Cases C and D show the effects of a tariff when it is levied on the comparatively *inelastic* source of supply, the former showing the effects when the demand is comparatively elastic, and the latter when it is comparatively inelastic. It will be seen that when the tax is levied on the comparatively inelastic source of supply, the increase in price is, other things remaining equal, less than when it is levied on the elastic supply. (Compare C with A, and D with B, with respect to the magnitude of pq.)[7]

These conclusions may also be expressed in mathematical symbols as follows:[8]

Let P be the price in the absence of any tax and let S_d and S_f be the present supplies to the home market from domestic and foreign sources, e_d and e_f their respective elasticities of supply, and η the elasticity of the domestic demand curve (η is necessarily negative). Then, if T_f be the tax on the foreign supply, "and if we assume that for the small portion of the demand and supply curves with which we are concerned, the elasticities do not alter," the change in price, ΔP, is given by the formula:

$$\Delta P = T_f \frac{e_f S_f}{e_f S_f + e_d S_d - \eta (S_d + S_f)} \qquad (1)$$

The same result might be written "in another and for some purposes more convenient notation." Let A and B represent the domestic and foreign *production*, e_d and e_f their respective elasticities of production, η_d and η_f those of demand in the two sources, respectively. Then

$$\Delta P = T_f \frac{e_d A - \eta_d A}{e_d A + e_f B - \eta (A + B)} \qquad (2)$$

[7] In drawing these graphs it was assumed that enough time has elapsed after the change in the tax for the new equilibrium to be established between supply and demand.

[8] Pigou, A. C., The Known and Unknown in Mr. Chamberlain's Policy, Fortnightly Review, Jan., 1904, page 44. Economics of Welfare, p. 942. I have taken the liberty to modify some of the symbols used by Professor Pigou.

It is evident, therefore, that economic theory offers a satisfactory solution of the problem of the effect of a tariff on the price of a commodity, provided we can determine the numerical values of the constants employed in the foregoing formulas.

The Statistical Approach to the Problem

The object of this paper is to determine one of these constants—the coefficient of the elasticity of demand—for an important article of consumption—beef. This involves, of course, the finding of the law of demand for beef. Data are lacking for the determination of the elasticities of supply.

Now the derivation of a concrete, statistical law of demand is beset with many difficulties, both theoretical and practical.

(1) In *theory* the law of demand for any one commodity is given only on the assumption that the prices of all other commodities remain constant (the old *ceteris paribus* assumption). This postulate fails in the case of a commodity like beef, for the prices of such rival commodities as mutton and veal can not be supposed to remain unaffected by a change in the price of beef.

(2) The validity of the theoretical law is limited to a point in time. But in order to derive *concrete, statistical* laws, our observations must be numerous; and in order to obtain the requisite number of observations, data covering a considerable period must be used. During the interval, however, important dynamic changes take place in the condition of the market. These secular changes obscure the relation between the prices and the amounts of the commodity demanded. In the case of beef, the principal dynamic effects that need be considered are the changes in the volume of production due to an increasing population, the decrease in our grazing areas, the changes in the purchasing power of money, and the fluctuations in the production and prices of corn and hogs.

Several other limitations of the theoretical law, as well as the difficulties that must be overcome in the derivation

of a concrete, statistical law, might be mentioned. Suffice it to say, however, that no matter what may be the number of disturbing elements affecting the quantity demanded or its price, no matter how complex the functional relations between them, their relative influence or strength may be quantitatively determined and allowed for by the method of multiple correlation.[9]

In the problem immediately before us—the derivation of the law of demand for beef—pressure of time and the lack of satisfactory statistical data prevented the making of detailed computations showing separately the relative influence of each disturbing element such as the increase in population, changes in the general level of prices, changes in the production and prices of the other kinds of meats on the demand for beef. Instead, one correction was made for the resultant of all the disturbing elements. The method of making this correction or allowance is best illustrated by reference to the actual data.

The available raw statistical data which on the whole seem best suited to the present inquiry are: (1) The total quantity of beef slaughtered under federal inspection in the United States, and (2) the prices at Chicago of "native beef" cattle per 100 pounds live weight.[10] These are admittedly imperfect indices of production and price. Beef slaughtered under federal inspection constitutes far from the entire slaughter. In the absence, however, of anything except estimates of farm and local uninspected slaughter, it seems preferable here to use definitely known figures. It is the federally inspected slaughter, moreover,

[9] For an example, the reader is advised to consult H. L. Moore's "Forecasting the Yield and the Price of Cotton," Ch. V. (The Law of Demand for Cotton), as well as pages 101-115. Professor Moore is a pioneer in this field. His other contributions to this subject are:

The Law of Demand, Ch. IV of his Economic Cycles: Their Law and Cause.

The Flexibility of Prices, Political Science Quarterly, Dec., 1919.

Elasticity of Demand and Flexibility of Prices, Journal of the American Statistical Association, March, 1922.

Perhaps it is worth while to call attention, in this connection, to the fact that Professor Moore's treatment of the law of demand does not depend for its validity upon his theory of economic cycles, as is supposed by some economists.

[10] For the selection of the data and their evaluation, the author is obligated to his colleague, Mr. Lynn R. Edminster, whose knowledge of the cattle industry was freely drawn upon in the preparation of this paper. The statistical data were derived from the following sources:

Chicago Daily Drovers' Journal, Jan. 2, 1923. (Average live weight per head and price per 100 pounds live weight.)

U. S. Bureau of Animal Industry. (Number of head of cattle slaughtered under Federal inspection.)

which may be assumed to bear most directly upon the price of beef cattle in the great markets.

The use of prices of native beef cattle at Chicago is likewise open to criticism. To be sure, they are usually taken as typical. Nevertheless, they relate to a smaller category than federally inspected slaughter, and they do not always respond to seasonal influences in the same manner and degree as other classes of cattle. If adequate data were available as to the relative slaughter of the various classes, a weighted average price for all would therefore be preferable. But "beggars must not be choosers." We are compelled to assume, therefore, that for the present purpose, prices of native beef cattle are reasonably representative of prices of all cattle slaughtered under federal inspection.

The period covered by our series are the 73 months from January, 1907, to January, 1913. It therefore begins with the first year for which statistics of federally inspected slaughterings are available, but falls short of the depression of 1914 and the outbreak of the European war.

The two series—production and prices—are graphed in Figures 2 and 3. For each series there is also shown its trend. The equations to the trends are:

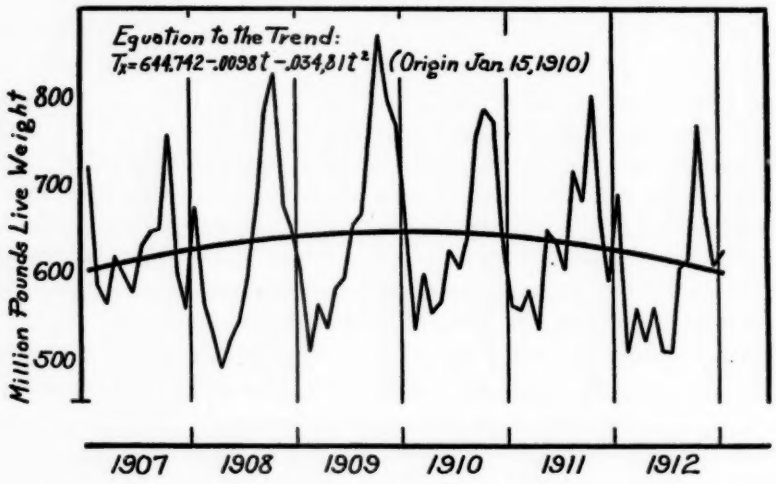
$$T_x = 644.742 - .0098t - .034{,}81t^2 \quad (3)$$

$$T_y = 6.5196 + .00832t - .000{,}623t^2 + .000{,}0234t^3 + .000{,}000{,}840{,}2t^4 \quad (4)$$

where T_x stands for the *trend* of production (slaughtering) in millions of pounds live weight, T_y for the *trend* of prices in dollars per 100 pounds live weight and t for time *in months*. The origin of each equation is at January 15, 1910.

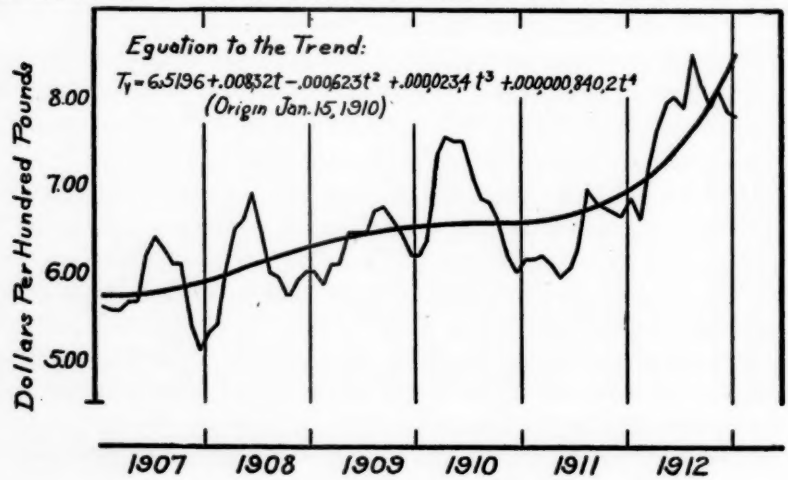
It will be seen from Figure 2 that the variations in production are seasonal, the minimum occurring about February and the maximum in October. So regular are the crests and troughs that they almost resemble those of a daily temperature chart. The fluctuations of the prices, on the other hand, exhibit no such regularity. Indeed, at first sight, there seems to be no relation at all between production and prices. That, however, is due to the fact that prices of beef, as might have been expected, are influenced

FIGURE 2. TREND OF THE QUANTITY OF BEEF SLAUGHTERED UNDER FEDERAL INSPECTION IN THE UNITED STATES.



by many other factors besides changes in production, viz., fluctuations in the general level of prices, in the prices of mutton, hogs, etc. These are the "disturbing elements," the "other things" which do not remain equal, and which tend to obscure the true relation between prices and quantities. They must, therefore, be eliminated. The method

FIGURE 3. TREND OF THE PRICES AT CHICAGO OF NATIVE BEEF CATTLE.



employed in this connection is that of trend ratios. With the exception of the method of partial correlation, which was not tried, this statistical device was found to give the best results in the problem before us.[11] Briefly stated, this method derives the demand curve not from the observed data of quantities and prices, but from the ratios of the data to their respective trends. The *rationale* of this method may be based on the following considerations:

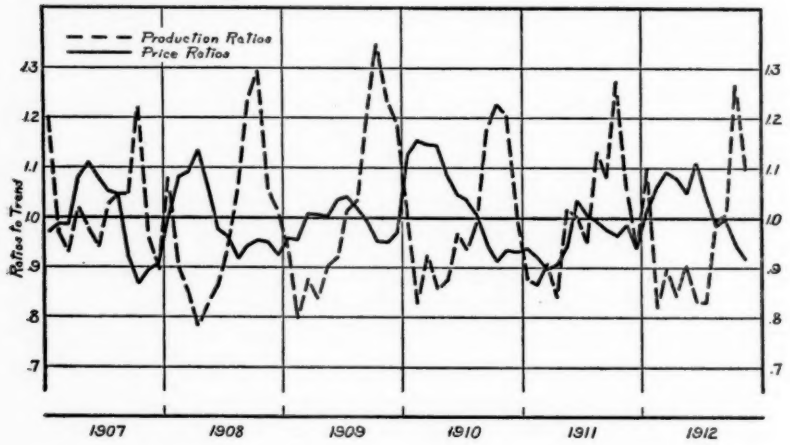
If, during the period when our observations were taken, "all other things" had remained equal, as theory demands, we should have no secular trend either of prices or of quantities. The existence of a secular trend in either series is *prima facie* evidence that "all other things" did not remain equal, that there was one or more disturbing factor or element. As a rule, the more important disturbing factors are fluctuations in the general level of prices, and an increase or decrease in population. It is the disturbing elements which give rise to the trend and which create a different "normal" from time to time. Hence it follows that by taking the *ratio* of the actual (observed) prices to normal or trend prices we eliminate, for all practical purposes, the effect of the disturbing elements on the price of the commodity under consideration. Likewise, by taking the *ratio* of the corresponding quantities (production, or slaughterings) to their trend, we eliminate approximately all the disturbing factors influencing the supply. By taking the percentage deviations of our variables from their respective trends we are practically overcoming the chief difficulties which, according to Edgeworth and others, lie in the way of deriving statistical laws of demand. For our data, though extending over a period of years, may, when thus adjusted, be conceived of as representing approximately observations taken at a given point in time—at least for practical purposes.

When the two series—the production ratios and the price ratios—are plotted, they exhibit a fair *inverse* correlation; that is, an increase in production is correlated, on the average, with a fall in price. The effect, however, is not immediate.

[11] It does not follow that this method would also give the best results when applied to other data.

Production reaches its highest point in October; prices reach their lowest point in December. Prices lag, on the average, two months behind production.[12] Figure 4 shows the moderate inverse correlation between the production ratios, when allowance is made for a two months' lag in prices. It is from these adjusted series that we proceed to derive our law of demand

FIGURE 4. COMPARISON OF THE RATIOS TO THEIR TRENDS OF BEEF PRODUCTION AND BEEF PRICES TWO MONTHS LATER. (Dates Refer to Beef Production.)



—the relation between the variation in the amount of beef produced and the corresponding most probable price.

The record of production and prices for each month constitutes an "observation." Thus, the observation for April, 1908, is as follows: Production = .779 (77.9 per cent of the normal trend); prices (for 2 months later) = 1.133 (113.3 per cent of the normal trend). Each of the 71 sets of observations is plotted as a point, the production being the abscissa, and the price being the ordinate. The result is shown in the scatter diagram. (Figure 5.)

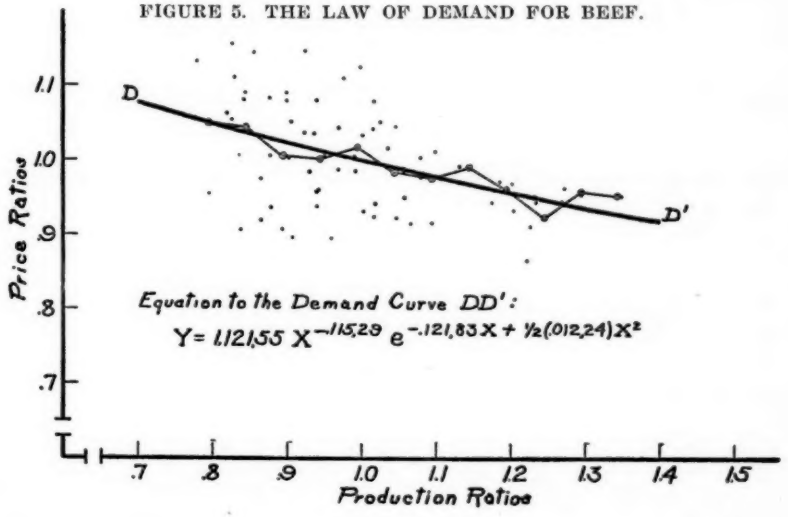
It will be seen that the general direction of the scatter is

[12] The coefficient of correlation between the two series, for various "lags" in prices, are as follows:

No lag,	$-.1272 \pm .0777$
Lag of 1 month,	$-.3902 \pm .0674$
Lag of 2 months,	$-.4591 \pm .0632$
Lag of 3 months,	$-.3624 \pm .0700$

from the upper left hand to the lower right hand side of the diagram. In other words, the *tendency* is for prices to decline as production increases. This tendency, however, is somewhat obscured by the individual observations. Its characteristics are more clearly shown by means of averages which are represented, upon the diagram, by circles. For example, for all months in which production is between .82 and .87 of normal, the corresponding prices form an array

FIGURE 5. THE LAW OF DEMAND FOR BEEF.



whose average is 1.0445 of normal. This representative value is represented by a circle whose abscissa is .845 (midway between .82 and .87) and whose ordinate is 1.0445. The circles are connected by a broken line.

But even the representative points do not tell the whole truth. In the words of Edgeworth, they "may be likened to a net with meshes so wide as to lose half the catch. To remedy this defect we might fill up the vacant spaces with a finer reticulation." This will be effected if we pass a continuous curve through these points. Probably the best curve for our purposes is given by Moore's "typical equation to the law of demand," [13] which is of the form

[13] Elasticity of Demand and Flexibility of Prices, Journal Amer. Statist. Assoc., March, 1922.

$$y = Ax^{a} e^{\beta x + \frac{1}{2}\gamma x^2} \qquad (5)$$

where x stands for the observed quantity and y for the observed price. This equation, as Moore shows, may also be written in the ratio form.

$$Y = A'X^{a'} e^{\beta' X + \frac{1}{2}\gamma' X^2} \qquad (5A)$$

where $X = \frac{x}{T_x}$ stands for the production ratio, and $Y = \frac{y}{T_y}$ stands for the price ratio. When this equation is fitted to our data, we obtain

$$Y = 1.121{,}55X^{-.115{,}29} e^{-.121{,}83X + \frac{1}{2}(.012{,}24)X^2} \qquad (6)$$

This is the law of demand for beef. Its graph is drawn in Figure 5.

Equation 6 gives the quantitative relation between the price ratios and production ratios of beef for the six-year interval from 1907 to 1913. It is the law of demand for beef in the *ratio form.* Moore has shown[14] that a simple transformation makes it possible to derive the demand for any one year in terms of *absolute quantities.* Thus, remembering that T_x is the trend of production for any year, and T_y the trend of prices for the same year; and that x and y are the corresponding actual (observed) production and price, we may substitute for X and Y in equation (6) their values $X = \frac{x}{T_x}$; $Y = \frac{y}{T_y}$. By making these substitutions, the law of demand in the *absolute form* becomes

[14] Ibid., p. 16.

$$Y = K_x \, e^{-.115,29 \; -.121,83\,(x/T_x) \; + \; \frac{1}{2}\,(.006,12)\,(x/T_x)^2} \qquad ----(7)$$

where $K = AT_y/T_x^a = 1.121,55\; T_y T_x^{.115,29}$. The values of T_y, T_x may be obtained for any one year from equations (4) and (3). In what follows, however, we shall be referring to the law of demand in the ratio form (Equation (6)).

The Margin of Error of the Law of Demand

From equation (6) we are able to find the most *probable* change in price corresponding to a given change in production. Thus, when the production (slaughterings) of beef is increased to 10 per cent above normal (i. e., X = 1.1) the price falls, on the average, to 2.28 per cent below normal (i. e., Y = .9774).

If all the points in Figure 5 lay on the curve, we could predict *exactly* the value of Y corresponding to a given value of X. But the points do not lie on the curve; they scatter around it. We must, therefore, measure the *degree* of scatter, or the limits within which any proportion of the actual observations (points) are distributed about the curve, in order to know what confidence to attach to the "most probable" figures derived from it. The statistical device which measures the accuracy with which the magnitude of one variable may be predicted from a knowledge of the other by the use of an equation is termed the "standard error," or the "standard deviation of an array." In the case of our law of demand for beef, the standard error is 6.77. This means that 68 per cent of the observations (or points) lie within a deviation from the curve of $\pm$ 6.77.

The significance of this figure may be illustrated further by reference to an example. We have found by means of our equation that when production of beef is 110 per cent of normal, the most probable price is 97.74 per cent of normal. The standard error of 6.77 tells us that the chances are 68 in 100 that the actual or observed price will *not* fall outside of the limits 97.74 + 6.77 = 104.51 and

97.74 — 6.77 = 90.97. In other words, if we use equation (6) for estimating prices from production, the chances are 68 in 100 that any *single* price thus computed will not vary by more than ± 6.77 per cent from the observed value. If, however, a *large number* of estimates are made by means of the same equation, the chances are 68 in 100 that the mean difference between the observed and computed values will not exceed $6.77/\sqrt{71} = .8$ per cent. These are large errors, indicating that the fundamental data on which our demand curve is based are far from being satisfactory.

We have now derived the law of demand for beef, and have given a measure to which it is an accurate description of the facts. There remains the task of determining the coefficient of elasticity at any point on our demand curve.

The Coefficient of Elasticity

The coefficient of elasticity of demand has been defined as the ratio of the relative change in the quantity of the commodity demanded to the corresponding relative change in price, when *the relative changes are infinitesimal.* In mathematical symbols,

$$\eta = \frac{\frac{dx}{x}}{\frac{dy}{y}} \equiv \frac{dx}{dy} \cdot \frac{y}{x} \equiv \frac{d\log x}{d\log y} \qquad (8)$$

where x stands for the quantity demanded, and y for price.

"The *elasticity* (or *responsiveness*) *of demand* in a market is great or small according as the amount demanded increases much or little for a given fall in price, and diminishes much or little for a given rise in price.

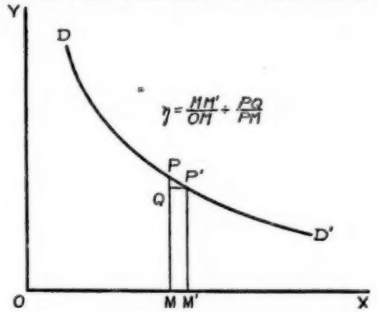
"We may say that the elasticity of demand is one, if a small fall in price will cause an equal proportionate increase in the amount demanded: or, as we may say roughly, if a fall of one per cent in price will increase the sales by one per cent; that it is two or a half, if a fall of one per cent in price makes an increase of two or one half per cent respectively in the amount demanded; and so on."[15]

Assuming that the law of demand for any commodity is represented by the curve DD′ in Figure 6, the coefficient

[15] Marshall: Principles of Economics, Eighth Edition, p. 102.

of elasticity of demand when OM units are bought is measured by $\frac{MM'}{OM} \Big/ \frac{QP}{PM}$. That is to say, it is measured by the ratio of the relative change in the amount demanded to the relative change in price, when the changes are small. *If the ratio is greater than one the demand is elastic; if it is less than one the demand is inelastic; and if it is exactly one the demand is neither elastic nor inelastic.* The size of the ratio measures the degree of elasticity.[16]

FIGURE 6. GRAPHIC REPRESENTATION OF THE ELASTICITY OF DEMAND.



The reason why a coefficient of exactly one is taken as the point of reference from which to measure elasticity of demand may perhaps be made clearer by reference to Figure 7.

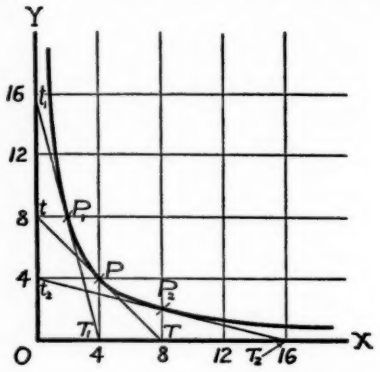
In this figure is graphed the following hypothetical demand schedule.

Price per unit Y	Number of units demanded X
16	1
10	1.6
8	2
4	4
2	8
1.6	10
1	16

[16] See H. L. Moore: Elasticity of Demand and Flexibility of Prices in the Journal American Statistical Association, March, 1922.

The chief characteristic of this schedule is that *no matter how we vary the price, the total outlay which purchasers make for the commodity is a constant, 16.* Thus, when the price is 4, the number of units sold is 4, and the total outlay is 4 x 4 = 16. When the price rises from 4 to 8, sales drop from 4 to 2; but the total receipts are the same as before (8 x 2 = 16). If such were the law of demand for a monopoly good which, let us assume, cost nothing to produce, it would be impossible to determine at what point the monopolist would limit his output, for his profits would

FIGURE 7. A HYPOTHETICAL DEMAND CURVE--ELASTICITY ONE.



be the same no matter what amount he puts on the market. If he increases or decreases his output by one per cent, the price will fall or rise by one per cent.[17] In other words, the ratio of the relative change in the quantity demanded to the relative change in price is unity; that is, the elasticity of demand is one.

Of course, in the case of most demand curves which we meet in practice, the coefficient of elasticity does not remain constant but varies from point to point.

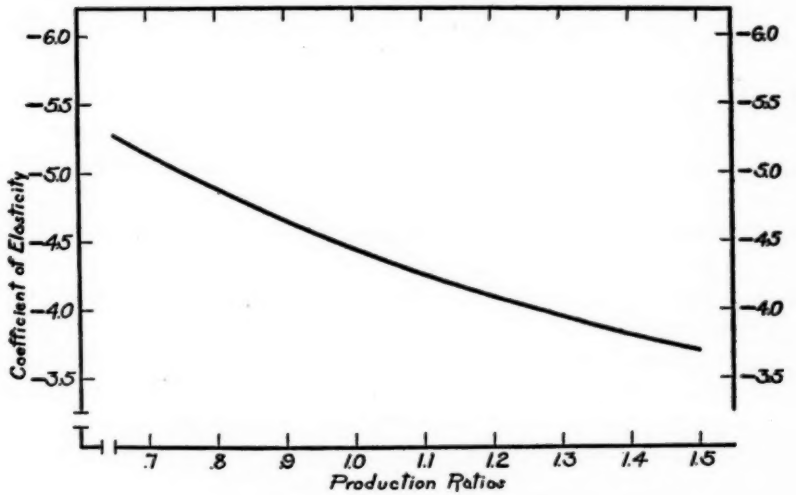
The magnitude of the coefficient of elasticity at *any* point on a demand curve may be determined geometrically. Thus, in Figure 7, if the line $t_1P_1T_1$ be drawn tangent to

[17] This is true so long as the percentage changes are small. But a 50 per cent decline in price must be accompanied, if the elasticity of demand is to be unity, by 100 per cent rise in sales.

the curve at the point P_1 ($x \equiv 2$, $y \equiv 8$), the coefficient of elasticity at this point is given by the ratio $\frac{P_1T_1}{P_1t_1} = 1$. Similarly, the coefficients of elasticity at P and P_2 are $\frac{PT}{Pt}$ and $\frac{P_2T_2}{P_1t_1}$ respectively. Of course, in the case of Figure 7 the coefficient at any point will be unity. The method indicated is, however, a perfectly general one.[18]

It is not, however, necessary or desirable to measure the coefficient of elasticity by the geometric or graphic method indicated above. If the *equation* to the demand curve is known, the coefficient at *any* point may be determined more

FIGURE 8. THE ELASTICITY OF THE DEMAND FOR BEEF.



easily and accurately by analytical methods. This is particularly true if Moore's "typical demand curve" is used, for by it we are enabled to infer immediately the coefficient of elasticity at any point. In the case of equation (6), the *reciprocal* of the coefficient of elasticity is [19]

[18] For proof, see Marshall: Principles of Economics, 8 ed., p. 839, Note III.

[19] Moore calls it the "coefficient of flexibility of rices," and designates it by ϕ.

$$\frac{1}{\eta} = \phi = -0.115{,}29 - 0.121{,}83X + 0.012{,}24X^2 \text{------} (9)$$

By means of this equation we can easily derive the coefficient of elasticity corresponding to any point on the demand curve. Its graph is traced in Figure 8.

It will be seen from the graph that the elasticity is very high at every point on the curve, varying roughly between —5.0 and —3.75 for observed production ratios of .75 and 1.4, respectively. The coefficient of elasticity is, then, higher for low production ratios (or for higher price ratios) than it is for high production ratios (or for low price ratios). But too much attention need not be paid to these variations, as the coefficient of elasticity has a considerable standard error. We estimate it to be roughly about 1.00.[20] The point on the curve in which we are most interested, as a rule, is the point at $X = 1$. At this point the coefficient of elasticity is —4.45. Hence we conclude that under ordinary conditions (i. e., when the production and prices are not much above or below "normal"), an increase in the slaughter of beef of 4.5 per cent will reduce prices by only 1 per cent, and vice versa. If slaughter be taken as equal to consumption, this means that an increase in the price of beef of 1 per cent will reduce consumption by 4.5 per cent, and vice versa.

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[20] This estimate is based on the following considerations. At and near the point $X = 1$, $Y = 1$, our demand curve practically coincides with the straight line

$$Y = mX = r\frac{\sigma_y}{\sigma_x}X = -.4591\frac{.069{,}570}{.138{,}755}X = -.2302X.$$

Now the standard error, s, of the slope, m, is (Yule, Introduction to the Theory of Statistics, 5th ed., p. 352)

$$s = \frac{\sigma_y\sqrt{1-r^2}}{\sigma_x\sqrt{n}} = .0529.$$

It can be proven (see the present writer's Note on the Elasticity of Demand and Coefficient of Correlation, Quarterly Journal of Economics, Nov., 1923) that at the point $X = 1$, $Y = 1$, the coefficient of elasticity is equal to the *reciprocal* of the slope, or to $1/m$. By the law of the propagation of error, the standard error of $1/m$ is $-\frac{1}{m^2}s = -\frac{1}{(-.2302)^2}.0529 = 1.0$.

That is to say, the chances are 68 in 100 that at the point $X = 1$, $Y = 1$, the coefficient of elasticity varies between —5.45 and —3.45.

Possible Objections

At this point it is advisable to anticipate a few objections that are likely to be raised against our findings.

1. "Would a different method of eliminating the disturbing factors lead to a different coefficient of elasticity?" As was said before, the best method of dealing with this problem—multiple correlation—could not be applied, because the data relating to the disturbing factors are lacking. Such fragmentary data, however, as are available, seem to support the main conclusion of this study, when they are analyzed by this method. Besides the method which was actually employed, the only other method of dealing with the problem of the disturbing factors, considering the meager data available, is the method of percentage changes, or month-to-month ratios. This method consists of correlating the relative change in the amount of the commodity that is bought, with the relative change in the corresponding price. "By taking the relative change in the amount of the commodity that is demanded, instead of the absolute quantities, the effects of increasing population are approximately eliminated; and by taking the relative change in the corresponding prices instead of the corresponding absolute prices, the errors due to a fluctuating general price level are partially removed.[21] When applied to our data, this method gives a coefficient of elasticity for beef of —9.6 instead of —4.5 obtained by the method of trend ratios. But, by the method of percentage changes, the coefficient of correlation between the price series and the production series is only one-half of what it is by the method of trend ratios.[22] We conclude, therefore, that the coefficient of elasticity of 4.5, which is derived from the more highly correlated set of variables, is the more reliable figure.

2. "Is it not possible that there is a shifting in the demand curve for beef between the summer months and the winter months, and that your demand curve is an average, or composite, of two separate demand curves?"[23] To test this

[21] Moore, H. L., Economic Cycles: Their Law and Cause, p. 69.

[22] $-.234 \pm .076$ as compared with $-.459 \pm .063$.

[23] This point, as well as the method of testing it, was called to the writer's attention by Professor Jacob Viner, of the University of Chicago.

hypothesis, the year was divided into two periods: January to June, and July to December.[24] The data relating to each period were then studied separately. The results seem[25] to show that the elasticity of demand for beef during the second half of the year is more than double of what it is during the first half, or —7.6 as compared with —3.1. This is what we should expect on a priori grounds. Beef (and probably meat in general) is not so "necessary" to us during the last six months of the year, because during these months meat substitutes—vegetables, etc.—are more plentiful than during the winter months. The weather, too, probably has a good deal to do with it. Professor Viner's point is then well taken. It does not, however, upset the findings as to the average coefficient of elasticity, which is about 4.5, and which is the figure one ought to use in studying the effect of the tariff on price.

3. "Would not the use of annual averages for production and prices yield a radically different value for your coefficient of elasticity?" We doubt it. Theoretical considerations lead us to believe that if monthly data yield a high coefficient of elasticity, annual averages based on the same date would do the same—at least within the margin of error of the data.[26] The trend, however, of annual data may, for a short series, be considerably different from that based on monthly data, and that may introduce some complications. It would be greatly desirable to have long series of suitable monthly data to test the various hypotheses. Such data, unfortunately, are not available.

4. "What you have is a producers', or wholesalers', not a consumers', demand curve." This is granted. There are no data as to the *actual* consumption of beef from month to month.

[24] The selection of these months was dictated by the fact that they are the ones in which the production curve crosses the price curve. (See Fig. 4.)

[25] We say "seem" because the margin of error of the coefficients is so high as to make the latter untrustworthy.

[26] The theoretical considerations upon which we base our opinion may be stated as follows:

When the two variables—quantity and price—are highly correlated, the coefficient of elasticity is the ratio of the variability of the quantity demanded to the variability of price. The proof is simple. Let the equation to the demand curve within limits of observation be $Y = mX$, where Y and X are the *monthly* ratios of prices and quantities to their respective trends, the origin of the equation being at the point

But this is not an important objection in this case. Beef as it is marketed in the United States is almost wholly in the perishable form. Hence, the volume which is consumed each month must correspond very closely with the volume slaughtered.[27]

Conclusion

At the outset of this study several questions were raised regarding the disturbance of the conditions of our beef supply caused by a tariff on beef. It was pointed out that no quantitative answers to these questions are possible, unless we could first derive the elasticity of the domestic demand and the elasticities of the domestic and foreign supply. We then proceeded to derive the first of these constants—the elasticity of the domestic demand— and found its value to be in the neighborhood of —4.5. We also indicated its margin of error, and anticipated a few objections both as to the data and method. The next step obviously is to derive the remaining constants, viz., the coefficients of the elasticity of the domestic and foreign supply. A knowledge of all of the constants would enable us to give *quantitative* answers to the questions raised at the beginning of this study. Such knowledge would not "take the tariff out of politics," or perform other miracles, but it would enable us to know what we are talking about in matters relating to the tariff. But the data which are necessary for the derivation of the coefficients of supply or production—comparable cost of production statistics in this country and

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$X = 1$, $Y = 1$. The coefficient of elasticity, η, is then $\eta = 1 \Big/ \frac{dY}{dX} = \frac{1}{m}$.

But $m = r \frac{\sigma_y}{\sigma_x}$, where r is the coefficient of correlation, and σ_y, σ_x, the standard deviation of Y and X, respectively. Hence, when r is near unity, $\eta = \sigma_x \div \sigma_y$, or the coefficient of elasticity will be greater than one, if $\sigma_x > \sigma_y$. These standard deviations, as was indicated above, are assumed to have been computed from monthly data. By deriving these constants from annual averages based on the same monthly series, we shall change their *absolute* values, but not their *relative* values.

[27] A fuller discussion of this objection is to be found in the forthcoming report of the Institute of Economics on Beef and the Tariff, which is being prepared by Mr. Edminster.

abroad[28]—are lacking. Without such data no complete answers to our questions are possible.

The discovery, however, that the demand for beef is highly elastic, enables us to localize our problem. There are good grounds for believing that the foreign beef supply is more elastic than the domestic supply.[29] Hence the effect of the tariff on beef falls under Case (A) of Figure 1, where the demand is elastic, and tax is levied on the elastic supply. It will be seen by reference to this diagram that the increase in price (pq) due to the tariff is not so great as it would have been, had our demand been inelastic, as in Case (B), but not so small as it might have been, had the foreign (taxed) supply been less elastic than the domestic (untaxed) supply, as in Case (C). But just by how much does the tariff on beef raise the price to the consumer is still an unanswerable question until certain statistical data are available. May we not hope that a better knowledge of the uses to which such data can be put will prove an incentive to their collection?

[28] i. e., the Argentine Republic.

[29] These grounds are discussed in a forthcoming publication of the Institute of Economics on Beef and the Tariff, which is being prepared by Mr. Lynn R. Edminster.

THE DETERMINATION OF HOG PRICES AT PUBLIC MARKETS

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Because of the significance of market prices in the economy of farm operations and because of the varying beliefs and traditions in vogue concerning the factors influencing them, it has appeared important to analyze, by means of adequate statistical methods, the problem of price determination at public livestock markets.

It is generally accepted as a fact that the quantity of livestock offered for sale (receipts), influences the quotations, and business logic suggests that the price which buyers are willing to pay, must be influenced by the wholesale selling prices obtainable for the products derived from the livestock. Receipts and wholesale prices on meat products have, therefore, been examined as to their price-determining effect, keeping in mind the fact that variation in livestock prices, not accounted for by variations in these two factors, would have to be credited to additional factors and subjected to further analyses.

Data

The following study is based on prices for hogs and pork products, because the quotations on these are available in considerable detail. The data are taken from "Weather, Crops and Markets" published by the U. S. Department of Agriculture and comprise the following items:

Monthly receipts of hogs, Chicago (A); monthly average prices for medium weight hogs, Chicago (X); monthly price quotations at eastern points on fresh pork loins (B); breakfast bacon (C); smoked hams (D); picnic shoulders (E); and lard (F). The time period included runs from January 1, 1920, to October 31, 1923, a total of 46 months, covering approximately a single hog production and price cycle.

Correlations

In order to study the relationships between the six variables mentioned, they have been correlated in all combinations of two with the results listed in Table 1.

TABLE 1.

Live Price	Receipts	—0.34±0.09
Live Price	Loin Price	+0.70±0.05
	Bacon	+0.93±0.01
	Ham	+0.88±0.02
	Picnic Shoulder	+0.94±0.01
	Lard	+0.92±0.02
Receipts	Loin Price	—0.64±0.06
	Bacon	—0.31±0.10
	Ham	—0.55±0.07
	Picnic Shoulder	—0.42±0.08
	Lard	—0.11±0.10
Loin Price	Bacon Price	+0.69±0.05
	Ham	+0.77±0.04
	Picnic Shoulder	+0.83±0.03
	Lard	+0.72±0.05
Bacon Price	Ham Price	+0.76±0.04
	Picnic Shoulder	+0.92±0.02
	Lard	+0.87±0.02
Ham Price	Picnic Shoulder Price	+0.90±0.02
	Lard	+0.73±0.05
Picnic Shoulder Price	Lard Price	+0.87±0.02

Live prices and receipts are negatively correlated, although the coefficient of —0.34 indicates a less pronounced effect than receipts are popularly supposed to have. Live prices and provision prices show a very strong positive correlation, the coefficients ranging from 0.70 to 0.94, indicating a very high degree of relationship.

The relative size of these coefficients indicates that prices on live hogs are more closely correlated with the prices on cured pork products and lard than with loin prices. This fact suggests that live prices are, therefore, more definitely determined by them than by loin quotations. Loin prices, on the other hand, are more intimately correlated with, and determined by, receipts, reflecting the necessity of the immediate sale of the perishable fresh pork in a volume nearly proportionate to the number of hogs received. The cured products and lard can be easily stored and their products are, therefore, less dependent on temporary fluctuations in slaughter. They appear consequently to be the principal stabilizer of hog prices in the face of variable receipts.

The whole system of variables presented in the foregoing tabulation is further complicated because receipts are negatively correlated with provision prices, which latter are, to a very high degree, positively correlated among themselves.

Multiple Correlation

With the purpose of this study in mind, to determine the degree to which variation in market prices on hogs are determined by the variations in receipts and provision quotations, the multiple correlation between live prices and the combined six other variables has been calculated.

Since the correlation coefficient for two variables equals the sum of all the paths of influence from one to the other, the series of simultaneous equations listed in Table 2 was set up.[1] The small letters indicate the respective path coefficients from A, B, C, D, E and F to X, while the figures indicate the respective coefficients of correlation.

TABLE 2.

	a	−.64	b	−.31	c	−.55	d	−.42	e	−.11	f	= −.34
−.64	a	+	b	+.69	c	+.77	d	+.83	e	+.72	f	= +.70
−.31	a	+.69	b	+	c	+.76	d	+.92	e	+.87	f	= +.93
−.55	a	+.77	b	+.76	c	+	d	+.90	e	+.73	f	= +.88
−.42	a	+.83	b	+.92	c	+.90	d	+	e	+.87	f	= +.94
−.11	a	+.72	b	+.87	c	+.73	d	+.87	e	+	f	= +.92

In solving the equations the values for the path coefficients were found to be the following:

$$\begin{array}{llll} a = -.404 & & d = +.126 \\ b = -.645 & & e = +.454 \\ c = -.024 & & f = +.874 \end{array}$$

The formula for multiple correlation in this particular case is:

$$r_{X(ABCDEF)} = ar_{XA} + br_{XB} + cr_{XC} + dr_{XD} + er_{XE} + fr_{XF}$$

where "r" represents the correlation coefficient for the factors indicated by the subscripts. From this, the following result is obtained:

$$r_{X(ABCDEF)} = 1.005.$$

[1] For discussion of methods and theory involved, see Sewall Wright, "Correlation and Causation," Journal of Agricultural Research, 1921, Vol. 20, pp. 557-585.

A coefficient of 1 indicates perfect correlation and the perfect determination of hog prices by receipts and provision prices. In the present case, the coefficient slightly exceeds perfection, but since only two decimal places were used in the coefficients of correlation only the first place following the decimal is mathematically significant.

Conclusions

As a result of this study, four conclusions may be drawn:

(1) If receipts were constant and provision prices were constant, hog prices would display no appreciable variation.

(2) Current hog quotations do, to a remarkably high extent, reflect the number of animals marketed by the producers as well as the prices which the consuming public is willing, at that particular time, to pay for the finished products in the volume available for sale.

(3) The six factors included in this analysis account for practically all variation in the average monthly hog prices, and other suspected causes of fluctuations either neutralize each other or are insignificant.

(4) For the period covered by the study, it appears that the causes of price variations in live hogs originated outside of the marketing system and in the field of production or consumption.

THE MARKET FOR AMERICAN AGRICULTURAL PRODUCTS IN THE UNITED KINGDOM

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The United Kingdom is the best foreign market for American agricultural products. England and Wales in particular have a large industrial population living on a small area of land with an agriculture which is entirely inadequate to supply food and raw materials for the needs of the country. The United Kingdom must import all the cotton and most of the wool for its great textile industries, a large part of its meat supply and the greater part of its bread cereals, also the tobacco and luxuries which to many people seem as important as food and clothing.

For many of these raw materials and foods the United States early became the chief source of supply. This was particularly true of cotton, meats, wheat and tobacco. About twenty years ago, however, exports of beef and wheat from the United States to the United Kingdom began to decline. At the opening of the century the United Kingdom obtained about 75 per cent of its imports of fresh and frozen beef and 50 per cent of its imports of wheat from the United States. By 1913 our exports of beef to the United Kingdom had been reduced to negligible proportions and we were supplying only 13 per cent of the wheat imports of the United Kingdom. During the war our exports of these commodities again increased, but after the war rapidly declined again. In 1923 the United States imported more fresh and frozen beef than it exported, and furnished only 9 per cent of the wheat and flour imported into the United Kingdom.

In a lesser degree the same decline is apparent in cotton. In the five years before the war the United Kingdom imported an average of 3,500,000 bales of American cotton which was 75 per cent of its total supply. In 1923 the corresponding imports were 1,400,000 bales comprising 52 per cent of its supply.

Among the agricultural commodities of first importance in the British import trade the United States has maintained its supremacy as a source of supply only in tobacco, lard and hams. Even in bacon an increasing share of Britain's trade is going to Denmark and Ireland.

In order to complete the picture it is necessary to consider several other items in the trade between the two countries. These items are not individually of great importance as compared with the commodities already mentioned, but added together their value is as great as the usual value of wheat or tobacco, although below the value of cotton or pork products. These commodities are—oil cake, apples, hops, milk, prunes, raisins, cottonseed oil, glucose, barley, oats and corn. Of these commodities the United Kingdom in 1923 imported from the United States, more than in 1913 of apples, milk, prunes, raisins and barley, about the same amount of oats, corn and glucose, but less of oil cake, hops and cottonseed oil.

All of these commodities both of first and second importance, combined in a rough index number of volume of imports into the United Kingdom from the United States with a 1913 base, show a relative volume of 88 in 1921, 90 in 1922 and 76 in 1923. Excluding cotton the index numbers would stand 136 in 1921, 127 in 1922 and 114 in 1923. An index number of the value of these same imports stood at 165 in 1921, 151 in 1922 and 135 in 1923. These figures seem more encouraging, until they are divided by the Board of Trade index number of wholesale prices when they appear as 84 in 1921, 95 in 1922 and 85 in 1923. Thus measured either by volume or by real value the agricultural trade of the United States with the United Kingdom is smaller than in 1913.

The economic factors which account for this decrease in our agricultural trade may be considered under three groups. 1. Changes in economic conditions affecting demand in the United Kingdom. 2. Changes in conditions of supply in the United States. 3. The competition of other countries producing the commodities under consideration. These factors apply in a different manner to each commodity, and may therefore be discussed under commodity headings.

Cotton

The status of the cotton trade of the United Kingdom is indicated in Table I.

TABLE I.—COTTON UNMANUFACTURED—IMPORTS INTO THE UNITED KINGDOM BY COUNTRIES, CALENDAR YEARS, AVERAGE 1909-1913, 1921 AND 1922

(Bales of 478 pounds net.)

Country from which imported	Average 1909-1913 1,000 Bales	1921 1,000 Bales	1922 1,000 Bales	1923 1,000 Bales	Per cent of total: Average 1909-1913	1921	1922	1923
United States	3,574	1,678	1,913	1,400	75.2	68.4	63.8	51.7
Egypt	836	484	661	729	17.6	19.7	22.0	26.9
Peru	55	125	162	(a)	1.2	5.1	5.4	(a)
British India	155	32	92	(a)	3.3	1.3	3.1	(a)
Brazil	63	34	77	44	1.3	1.4	2.6	1.6
Other countries	65	102	95	535	1.4	4.1	3.2	19.8
Total	4,748	2,455	3,000	2,708	100.0	100.0	100.0	100.0
Re-exports	585	318	178					
Net imports	4,163	2,137	2,822	2,708				

Compiled from: Trade of the United Kingdom for 1909-1913-1922 and Trade and Navigation of the United Kingdom for 1923.
Note: (a) If any, included in Other Countries.

Much of the cotton imported into the United Kingdom is manufactured into cloth in the Lancashire Mills and exported again as a finished product. This export trade in cotton textiles was seriously affected by the war. To some extent the consuming power of some of England's customers was reduced, but of much greater significance was the increase in the number of textile mills in the United States and in the Orient, during the years in which British cotton goods could not readily be obtained. The consequent great decrease in manufacturing in Lancashire has contributed to the serious unemployment situation in England and has decreased the purchasing power of the British population. The great increase in the price of cotton also has tended to restrict demand, although the higher prices obtained have been some offset to decreased volume of business.

The cotton situation in the United States, however, reveals the fundamental determining factors in the decrease in the cotton trade. The boll weevil has decreased cotton production in the United States, while at the same time the increase in the

number of cotton mills in the Southern States has held a larger part of our cotton at home.

The factor of foreign competition in the production of raw cotton is in this case a result, rather than a cause of our decreased exports. Every effort has been put forth by other countries to increase their cotton production to take advantage of the high prices, but the table above indicates that the success of these efforts has not been great. Egypt has evidently reached its limit in cotton production, the crop of British India is always uncertain and of poor quality; the Brazilian production is also irregular and does not develop as rapidly as might be expected in view of the vast areas capable of producing cotton; Peru, Argentina, Australia and East Africa have made material increases in production but their total output is still small as compared even with the reduced output of the United States.

In spite of decreased markets for its textiles, the United Kingdom would still be able to take a much greater volume of cotton than in the past three years at a price much higher than in 1913, if the United States had the cotton to sell.

Wheat and Flour

Table II shows in a condensed form the wheat situation of the United Kingdom, with certain adjustments in the figures to show more accurately the origin of North American wheat and flour imports.

TABLE II.

WHEAT, INCLUDING FLOUR: IMPORTS INTO THE UNITED KINGDOM.

Calendar Years: Average 1909-1913, 1921, 1922, 1923. Adjusted to allow for transit shipments and diverted shipments.

Country from which imported	Average 1909-1913	1921	1922	1923
	1,000 Bu.	1,000 Bu.	1,000 Bu.	1,000 Bu.
United States	29,134	58,586	33,929	19,331
Canada	62,167	71,369	107,122	117,668
Argentina	31,449	8,029	35,848	39,930
Australia	23,180	41,087	35,064	13,278
Russia	29,420	0	0	[1]

[1] If any, included in "Other Countries."

Country from which imported	Average 1909-1913 1,000 Bu.	1921 1,000 Bu.	1922 1,000 Bu.	1923 1,000 Bu.
British India	36,200	4,966	910	23,373
Rumania	1,714	0	0	[1]
Other countries	6,987	6,924	1,691	4,955
Total	220,251	190,961	214,564	218,535
Domestic production	59,640	73,792	65,248	58,416
Total supply	279,891	264,753	279,812	276,951
Exports	5,607	11,078	6,252	11,429
Correction for stocks	— 130	+ 23,750	+ 2,960	—2,800
Net supply	274,154	277,425	276,520	268,322

Per cent of total

	Average 1909-1913 Per cent	1921 Per cent	1922 Per cent	1923 Per cent
United States	13.2	30.7	15.8	8.9
Canada	28.2	37.4	50.0	53.8
Argentina	14.3	4.2	16.7	18.3
Australia	10.5	21.5	16.3	6.1
Russia	13.3	----	----	----
British India	16.4	2.6	.4	10.7
Rumania	.8	----	----	----
Other countries	3.2	3.6	.8	2.3
Total	100.0	100.0	100.0	100.0

Compiled from Annual Statement of the Trade of the United Kingdom 1909-1913, 1921, 1922 and Accounts Relating to Trade and Navigation of the United Kingdom, Dec., 1923. Imports from the United States and Canada adjusted to allow for diverted shipments and transit shipments.

One of the most striking features of Table II and also of similar statistics over a longer period of years, is the inelasticity of the wheat consumption of the United Kingdom as shown by the net supply from year to year. Since the population of the United Kingdom has increased slightly it is evident that the per capita consumption is still slightly lower than before the war, but not enough lower to bring the imports of wheat and flour below pre-war figures. The share of the United States in these imports, however, declined rapidly in the twelve years before the outbreak of the war from about 50 per cent to 13 per cent. The war, by shutting off wheat from Russia and to some extent from India and the Southern Hemisphere, again stimulated imports from the United States. Since the war, however, the decline has been more rapid than before.

[1] If any, included in "Other Countries."

It is evident from the constant British demand for wheat that economic conditions in the United Kingdom are not responsible for the decline in the imports of wheat from the United States. Furthermore, since we have had a supply as large or larger than before, at ruinously low prices the cause of the decline cannot be looked for in this country. The logical and sufficient reason may be found in the competition of other producing countries, of which Canada and Argentina are the most important. In these countries wheat can be produced in vast quantities at a cost far lower than the costs of production in the United States. There is no reason to expect any increase in the cost of production in these countries or any great decrease in costs in the United States. To make the situation still worse from the point of view of the wheat producer in the United States, Russia has again entered the world wheat market, and while it cannot immediately reach its prewar position, its potentiality as a competitor may be indicated by the fact that it exported in the years 1909-1913 an average of 162,000,000 bushels of wheat, of which 30,000,000 bushels went to the United Kingdom.

Pork Products

The British demand for American pork products has been well maintained since the war. A group index number of volume of imports of pork products into the United Kingdom from the United States, including bacon, hams, lard and frozen pork on a 1913 base stood at 133 in 1921, 140 in 1922 and 159 in 1923. In pork products the United States has also held its proportion of the trade of the United Kingdom as shown by tables III, IV, and VI.

HAMS: IMPORTS INTO THE UNITED KINGDOM BY COUNTRIES, CALENDAR YEARS, AVERAGE 1909-1913, 1921-1923

Country from which exported	Av. 1909-1913	1921	1922	1923	Per Cent of Total Av. 1909-1913	1921	1922	1923
	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.				
United States	94,241	114,320	147,903	181,475	92.3	90.6	92.1	92.7
Canada	7,125	10,517	10,793	12,802	7.0	8.3	6.7	6.5
Other countries	684	1,396	1,827	1,397	.7	1.1	1.1	.7
Total	102,050	126,233	160,523	195,674				

COMPILED FROM: Annual Statement of the Trade of the United Kingdom 1909-1913, 1921 and 1922 and Accounts Relating to Trade and Navigation of the United Kingdom, December, 1923.

LARD: IMPORTS INTO THE UNITED KINGDOM BY COUNTRIES, CALENDAR YEARS, AVERAGE 1909-1913, 1921-1923

Country from which exported	Av. 1909-1913	1921	1922	1923	Per Cent of Total Av. 1909-1913	1921	1922	1923
	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.				
United States	185,882	222,923	234,145	232,476	94.0	87.5	90.9	85.2
Other countries	11,947	31,980	23,379	40,372	6.0	12.5	9.1	14.8
Total	197,829	254,903	257,524	272,848				

COMPILED FROM: Annual Statement of the Trade of the United Kingdom 1909-1913, 1921 and 1922 and Accounts Relating to Trade and Navigation of the United Kingdom, December, 1923.

PORK (CHILLED AND FROZEN): IMPORTS INTO THE UNITED KINGDOM, CALENDAR YEARS, AVERAGE 1909-1913, 1921-1923

Country from which exported	Av. 1909-1913	1921	1922	1923	Per Cent of Total Av. 1909-1913	1921	1922	1923
	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.				
United States	734	14,740	8,998	19,469	21.7	38.6	39.4	69.7
Other countries	2,649	23,495	13,840	8,444	78.3	61.4	60.6	30.3
Total	3,383	38,235	22,838	27,913				

Compiled from: Annual Statement of the Trade of the United Kingdom 1909-1913, 1921 and 1922 and Accounts Relating to Trade and Navigation of the United Kingdom, December, 1923.

BACON: IMPORTS INTO THE UNITED KINGDOM BY COUNTRIES, CALENDAR YEARS, AVERAGE 1909-1913, 1921-1923

Country from which exported	Av. 1909-1913	1921	1922	1923	Per Cent of Total Av. 1909-1913	1921	1922	1923
	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.				
United States	197,468	281,050	275,897	316,810	38.6	44.2	41.5	36.3
Denmark	232,527	207,187	264,738	395,423	45.4	32.6	39.8	45.3
Canada	47,085	94,531	82,575	93,440	9.2	14.9	12.4	10.7
Other countries	34,767	53,122	41,191	67,160	6.8	8.3	6.2	7.7
Total	511,847	635,890	664,401	872,833				

Compiled from: Annual Statement of the Trade of the United Kingdom 1909-1913, 1921 and 1922 and Accounts Relating to Trade and Navigation of the United Kingdom, December, 1923.

It will be noted that the total imports of pork products have increased in volume, even allowing for the inclusion of imports from the Irish Free State since April, 1923. The chief reason for this increased consumption of imported pork is probably to be sought in the comparative prices of pork and mutton. On the basis of 1913 import prices, the import prices of imported pork products in 1923 were roughly 120, beef chilled and frozen was 140 and mutton and lamb 190. British dietary habits change very little from year to year, especially as to the amounts of staple foods consumed. In prosperous years and in years of depression the total consumption of wheat and meat

remains fairly constant. There has been, however, a distinct tendency to substitute cheaper meats for those which are more expensive, and this has resulted in a reduced consumption of mutton and lamb with a corresponding increase in pork consumption. British domestic pork supplies were low at the close of the war, but the number of hogs has since been brought back to normal, probably at the expense of decreased slaughter and increased imports.

In this process the United States has gained through its advantageous position in pork production. It has not, however, enjoyed the fullest possible advantage in the bacon trade, because of the preference of the higher class trade in Great Britain for Danish bacon.

The maintenance of this increased trade in pork products depends, therefore, upon the continuance of the conditions which have produced it; low prices as compared with the prices of other meat products.

Tobacco

The British market for tobacco has also been well maintained, as may be seen from Table VII.

TABLE VII.—TOBACCO: IMPORTS INTO THE UNITED KINGDOM BY COUNTRIES, CALENDAR YEARS, AVERAGE 1909-1913, 1921, 1922, 1923

Country from which imported	Av. 1909-1913	1921	1922	1923	Av. 1909-1913	1921	1922	1923
	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	Per Cent of Total			
United States	116,288	214,757	166,822	155,434	88.5	94.3	90.2	89.4
Turkey	5,039	456	526	18,448	3.8	.2	.3	10.6
Netherlands	4,923	481	982		3.7	.2	.5	
British India	21	1,415	3,935			.6	2.1	
Greece	126	1,145	1,236		.1	.5	.7	
Other countries	5,019	9,583	11,356		3.8	4.2	6.1	
Total imports	131,416	227,837	184,857	173,882	100.0	100.0	100.0	100.0
Re-exports	3,917	16,337	11,135	14,634				
Net imports	127,499	211,500	173,722	159,248				

Compiled from: Annual Statement of the Trade of the United Kingdom 1909-1913, 1921 and 1922 and Accounts Relating to Trade and Navigation of the United Kingdom, December, 1923.

It is probable that the consumption of tobacco in the United Kingdom was increased by the war, and it is not likely that economic conditions in such a country as England would have

much effect on the amount of tobacco consumed, once the habit became thoroughly established.

The British public has a very constant preference for American tobacco, and there seems to be little danger from competition of other producing countries. The ten per cent imported from other countries consists largely of types not produced to any extent in the United States, and is used for cigarettes, cigar wrappers and binders, etc.

Minor Agricultural Imports Into the United Kingdom

Oil cake imports into the United Kingdom have decreased materially as compared with the years before the war. This decrease is probably due to a decrease in the numbers of livestock, which in turn has contributed to the increase in the British demand for American pork products. In 1913 the United States furnished about one-third of the cottonseed cake imports and about one-fourth of the linseed cake imports, and was the largest single source of supply for both. In 1922 the imports of cottonseed cake from the United States were only about one-fourth of the total, Egypt furnishing more than half of the imports. The imports of linseed cake from the United States have decreased slightly, but have increased proportionately.

Imports of raw apples increased from 365,000,000 pounds in 1913 to 500,000,000 pounds in 1922, but the imports from the United States while somewhat larger in the aggregate were only 34 per cent of the total in 1922 as compared with 42 per cent in 1913. Imports from the United States during the season just closed were greater than in the previous season, but figures are not available for direct comparison of 1923 with 1913. In the apple trade Canada is the chief competitor of the United States. Australia also is shipping apples to the United Kingdom in increasing quantities, but these apples come on the market at a different season of the year, and are not directly competitive.

The United States has been for many years the chief source of the hops imported into the United Kingdom. The quantity

imported, however, varies greatly from year to year and there seems to be a tendency toward decreased consumption. In 1923 there was an over supply of hops in the United Kingdom due to accumulated stocks and large domestic production, and in consequence imports were negligible.

Before the war the supplies of condensed and evaporated milk were obtained almost entirely from the Netherlands, Switzerland, Denmark and Norway. During the war these supplies were not available and the United States became the chief source of supply. But with the return of normal trade relations the continental countries have again built up their dairy production, and are winning back the British markets. Here again the extent of our trade is a question of competition rather than demand and supply as between the United Kingdom and the United States.

More prunes are being imported than in 1913 by about 50 per cent, and the United States remains as before the war the chief source of supply.

Raisin imports have also increased by about 50 per cent, but whereas in 1913 the United States furnished less than one per cent of the imports it now supplies about one-third of the total. Before the war more than half of the raisin imports came from Asiatic Turkey, where disturbed conditions have reduced the supply. The market for American raisins in the United Kingdom will probably remain good in the future, but increased competition may be expected not only from the Near East and Spain, but from India, Australia and South Africa.

British supplies of glucose come almost entirely from the United States. The demand is constant and there is no indication of competition to be feared.

In 1913 the United States was the source of practically all the British supplies of cottonseed oil. Since the war, however, not only have British imports of cottonseed oil declined, but the United States has been practically eliminated as a source of supply, the greater part of British imports now coming from Egypt. This situation is probably due to a substitution of other oils in British consumption, and also to the diminished supply in the United States.

Barley, oats and corn have been imported in much smaller quantities since the war than before, because of a smaller demand for feedstuffs. With the elimination of Russian competition during the war the United States became the chief source of supply for imported barley, with Canada as the only important competitor. In 1920, however, Rumania began to ship barley to the United Kingdom and now Russia is again a possible source of supply. The United States fell heir also to the share in the British market for oats formerly held by Russia, but in the case of oats, Argentina is the chief source of supply, and the United States now can sell to the United Kingdom only in years of crop shortage in Argentina. Argentina is also, in years of good crops, the source of most of the corn used in the United Kingdom, and the United States can never depend on a British market for this cereal.

Since the war the United Kingdom has in some years imported sugar from the United States in considerable quantities, but as this sugar is chiefly Cuban sugar refined in American refineries, it is not strictly an agricultural product of the United States and need not be considered in this connection.

Conclusion

It is apparent from this discussion that in the British market for agricultural products the economic factors usually considered as determining demand within a country do not primarily determine the volume of agricultural imports from the United States. The commodities in question, with the possible exception of cotton, are necessities of which a constant supply is essential regardless of prosperity or depression. Even in periods of distress the British workman will buy simple foods, clothing, and tobacco with unemployment doles, even if he can buy little else. The decline in imports of American cotton is the result, first of a decrease in supply in the United States, second of the loss of British foreign markets for cotton goods, and third, of some possible decline in the purchasing power of British consumers. In the case of most other commodities any decline in imports from the United

States will usually be found to result from competition of other sources of supply.

From this analysis it is reasonable to expect that in the future the United Kingdom will continue to import from the United States: 1. Cotton, in decreased volume; 2. Tobacco, in constant or perhaps increasing volume; 3. Pork Products, as long as the price remains low and in reduced quantities at higher prices; 4. Wheat and Flour in small quantities, varying with the degree of competition from Canada and Argentina; 5. Feedstuffs, in considerable quantities only in years of crop shortage in competing countries; 6. Fresh fruits, in fairly constant but relatively small quantities; 7. Dried fruits in fair volume, depending on the price and the future growth of competition; 8. Glucose, and perhaps other specialized grain products, in the same volume as in the past, with little competition.

Improvement in economic conditions in the United Kingdom will not materially increase the demand for American agricultural products as compared with similar products from other countries, and in the case of pork products increased purchasing power might tend to shift the demand to more expensive meats and fats, which are chiefly imported from other countries. Few American products command a premium on the British market on the score of quality. Higher prices are usually paid for Egyptian cotton; for Canadian wheat; for Danish bacon; for Argentine corn; and Dutch, Swiss, and Danish dairy products. We have held foreign markets in the past by virtue of our volume of production and low prices. Our supremacy on these points is now being challenged and, in order to maintain our markets for many of our customary exports, we must either be able to underbid in price or study the demand with a view to furnishing quality products which will command higher prices.

AGRICULTURAL ECONOMICS

RECENT PUBLICATIONS

Compiled by Mary G. Lacy, Librarian, Bureau of Agricultural Economics, U. S. Department of Agriculture.

APP, FRANK, AND WOODWARD, C. R. The farmer and his farm. New York, Harcourt, Brace and co., [1924]. (The farmer's bookshelf, ed. by K. L. Butterfield.)

The authors have endeavored to set forth the economic principles which underlie the successful operation of the farm business and to show their practical application.

CURRIER, E. L., LENNES, N. J., AND MERRILL, A. S. Farm accounting. New York, The Macmillan company, 1924.

This volume is designed as a text for an introductory course in farm accounting whether the course is given in the high school or the agricultural college. "It is recognized by students of farm management that one of the most important steps that can now be taken in the advancement of farming is a more general adoption of the practice of keeping farm accounts." There is a set of data included from Kansas, Iowa, Montana and New York in an effort to present sufficient variety to provide for many different local needs.

ELY, RICHARD T., AND MOREHOUSE, EDWARD W. Elements of land economics. New York, Macmillan, 1924.

The present volume is intended to accomplish a double purpose: First, to deal in a scientific but elementary way with land as an economic factor as other books in general economics deal with all economic factors; and second, to furnish a foundation of economic principles for the treatment of land as a commodity. Adapted from author's preface.

GALPIN, CHARLES J. Rural social problems. New York and London, The Century co., [1924].

Up to the present time rural humanism has been outgeneraled by the forces of rural finance, which keep promising that all the good things of life will come of their own accord to rural society, if only everybody will turn in and make agriculture a paying business. The hour is coming, however, when the humanizing forces inherent in agriculture and country life will break the leash and strike out to find the way to modernized living, for they are now pretty well aware that agriculture will never be prosperous enough out of its own coffers, however well filled they may be, to guide farm men, women and children to goals of life which require ideals of living to comprehend. Author's preface.

FEDERATION OF BRITISH INDUSTRIES. The resources of the Empire series. London, Benn, 1924.

This series of volumes brings together information as to the resources of the British Empire in food and raw materials. The volumes have been written by experts to show what the various parts of the Empire are doing to supply the Empire's needs and to what extent these supplies can be increased when the requisite capital and organization are forthcoming. Some of the volumes

contain valuable bibliographies. The titles of the volumes follow: V. 1, Food supplies; v. 2, Timber and timber products; v. 3, Textile fibres and yarn; v. 4, Fuel; v. 5, Rubber, tea, cacao and tobacco; v. 6, Leather; v. 7, Chemicals; v. 8, Ferrous and non-ferrous metals; v. 9, Oils, fats, waxes and resins; v. 10, Communications.

GREAT BRITAIN. Agricultural tribunal of investigation. Final report. London, H. M. Stationery off., 1924. ([Parliament, Papers by command] Cmd. 2145.)

This report draws attention to the remarkable decline which has taken place in Great Britain in the last fifty years in cereal crops and in roots. In foreign countries there has been, on the whole, an increase in the arable area; at least, it has been maintained.

With regard to employment in agriculture there has been a relative decline in all countries. With regard to tenure it is suggested that the government should institute an inquiry into agricultural tenancies. The report also makes recommendations as to the extension of small holdings and considers the subject of tariffs, education and research costings and cooperation. On the last subject a striking fact brought out is the universality of the movement and its phenomenal growth within a comparatively short period of time. With respect to credit it is recommended that farm loan boards should be established. Other recommendations cover cooperative insurance, administrative organization, and the Councils of Agriculture, and experiments in arable stock farming.

The report observes that there is no ground for depreciation of British agriculture as a whole, in view of the great development of British manufactures. British agriculture does not suffer by international comparison of existing efficiencies. The fundamental difference between British and foreign agriculture is not the efficiency, but the size of this industry in relation to all industries. Lines of agricultural policy which might be pursued are indicated. Adapted from The Times (London).

INTERNATIONAL FARM CONGRESS OF AMERICA. Directory of agricultural organizations and institutions, 1924. Kansas City, Mo., [1924].

Comprehensive and useful directory.

LEWIS, HOWARD THOMPSON, ED. The economic resources of the Pacific Northwest; ed. by Howard T. Lewis and Stephen I. Miller. Seattle, Lowman & company, [1923].

The various chapters are by specialists in different fields and the whole provides an excellent survey of the economic resources of the Pacific Northwest. Some of the chapter headings follow: Grain resources of the Northwest, Livestock industry of the Northwest, Small fruits and canning, The apple industry, Forestry and lumbering, Flour milling.

NOURSE, EDWIN G. American agriculture and the European market. New York, McGraw-Hill, 1924.

This study of European needs, European purchasing power and the competition offered by other food-producing countries, has led the Institute of Economics to conclude that "the pre-war trend of decreasing exports has been renewed in intensified form. Europe's agricultural production is being restored faster than her industry, and, consequently, than the buying power of her cities. And the competition of rival producing areas is keener than ever before.

The whole economic tide is against an increase of European demands and higher prices for American foodstuffs in the immediate future. The solution of the farmer's ills must therefore be sought in internal readjustments."

NOURSE, E. G. Fifty years of farmers' elevators in Iowa. (Iowa Agr. exper. sta. Bul. 211, March, 1923, 37 p.)

"A history of elevator developments in Iowa and probable future developments. Nine figures and eight tables." Amer. econ. rev. Sept., 1923, p. 544.

STEEN, HERMAN. Cooperative marketing: The golden rule in agriculture. New York, Doubleday, Page & co., 1923.

"In this work, which is the first book by the author and also the first volume in the American Farm Bureau Library, there has been brought together the most complete set of sketches and brief descriptions of American cooperative marketing companies thus far published."—Theodore Macklin in Amer. econ. rev. Mar., 1924, p. 102.

VENN, J. A. Foundations of agricultural economics. London, Cambridge Univ. Press; New York, Macmillan, 1923.

The preface describes this volume as an attempt to bring within reasonable compass some account of the numerous economic problems which affect the agricultural community. The author is Gilbey Lecturer in the History and Economics of Agriculture at Cambridge and the volume is in reality an historical and economic survey of agriculture as it has developed in England.

WALLACE, H. C. The wheat situation: A report to the President. Washington, Government printing office, 1923.

Reviews the world wheat situation, distribution of the wheat crop of the United States, Canadian competition and the tariff, cost of producing wheat, freight rates as a factor in the situation; and makes recommendations to bring relief to the American wheat farmer.

WARBASSE, J. P. Cooperative democracy. New York, The Macmillan co., 1923.

Contains a section devoted to agricultural producers' cooperation and the evolution of consumers' control in agriculture.

WHITBECK, R. H., AND FINCH, V. C. Economic geography. 1st ed. New York, [etc.]. McGraw-Hill book company, inc., 1924.

The authors have tried to emphasize cause and effect relations and to show how peoples in pursuing their economic activities have adjusted themselves to their geographical environment . . . To indicate *why* particular crops are raised in certain places and *why* one nation has directed its economic life along certain lines and another along other lines . . . It is this study of human adjustments that lifts geography to the level of a science and gives it a considerable part of its educational value. Preface.

NEWS NOTES

A. B. GENUNG, ASSOCIATE EDITOR

Professor A. W. Manchester is preparing for publication the results of three years cost accounts on 25 Connecticut farms.

The economic studies of Connecticut agriculture projected by the department of agricultural economics of the Connecticut Agricultural College under the direction of Professor I. G. Davis is making substantial progress. A brief statistical and graphic description of Connecticut agriculture based on the 1920 census by towns is being prepared. The first type area study has been made in the township of Lebanon. This study includes the following phases:

1. A detailed soil survey.
2. A detailed land use survey.
3. A complete farm organization survey of each farm in the town.
4. A survey of the expenditure of money and time and the standards of living in the farm homes.

The inter-relations of soil type, location, land use, farm organizations and the standards of living in the farm home will be studied.

Dr. E. H. Jenkins, for 47 years a member of the staff and for 25 years Director of the Connecticut Agricultural Experiment Station, is preparing a monograph on the history of Connecticut agriculture. This will be published before the end of the year.

Dr. C. E. Ladd, formerly of the department of agricultural economics at Cornell University, has resigned his position, effective July 1, to become Director of Extension. Dr. Ladd succeeds Mr. M. C. Burritt who resigned as Director of Extension to operate his farm at Hilton, New York.

Dr. Warren addressed the annual meeting of the Chamber of Commerce of the United States in Cleveland during May.

Professor G. P. Scoville and a party of assistants are spending June in Newfane Township, Niagara County, New

York, obtaining records on the business organization of fruit farms for the eleventh consecutive year.

A new farm account book is being printed by the Delaware Agricultural Extension Service and will soon be ready for distribution. Farm Record keeping is being motivated in Delaware by the banks as a result of the Banker-Farmer Conference held in the State in May.

R. O. Bausman, County Agent, New Castle County, Delaware, has been granted leave by the Extension Service to take the summer course in farm management and economics at Cornell. The Delaware Extension Service started this plan last year of allowing extension workers short leave for special study or graduate work.

A four-year curriculum in agricultural economics has been adopted at Virginia Polytechnic Institute, an outline of which is included in the new college catalog. New courses which have been added include agricultural geography, history of American agriculture, industrial history of England, statistical methods, agricultural finance, land economics, advanced agricultural economics, and rural sociology. During the past three years, there have been taught courses in marketing farm products, agricultural cooperation, and agricultural prices. These courses will be continued.

Dr. James Allen Dickey will assume his new duties at V. P. I. about July 1. Dr. Dickey will serve the Extension Division as specialist in Rural Social Organization and will serve the college as an associate professor of rural sociology. Dr. Dickey has held a research fellowship at Cornell University. He obtained his M. A. degree from the University of North Carolina, which is his native State and in which State he has conducted research into religious activities, child labor conditions and farm tenancy.

The Virginia Agricultural Experiment Station, in cooperation with the Bureau of Agricultural Economics, U. S. D. A., plans to make two surveys this summer and fall, one a study of the beef cattle industry to determine the costs and factors

affecting cattle prices, comparing grass-finished steers of Southwest Virginia with grain-fed steers of the Shenandoah Valley. The second survey is a study of production, distribution, and consumption of food products of the city of Roanoke with its local farm production areas.

The Georgia State College of Agriculture cooperated with the Bureau of Agricultural Economics in securing records on the cost of producing cotton under boll weevil conditions. This survey, which is to supplement previous surveys, was made the last week in May. Fifty records were secured in Greene County and 50 in Sumter County.

County agents in Georgia were encouraged in assisting in the adoption of more definite county farm programs this year. Activities along this line have resulted in each county agent getting his leading farmers and business men together and adopting definitely a clean-cut program. About 25 agents worked up very elaborate programs, which were put in bulletin form and distributed to the farmers of the county. These programs contain surveys of the production and consumption in the county and contain a definite method of procedure.

County agents used as a basis data that had been worked up by the Department of Farm Management at the College. This contained the labor distribution on various crops. These bulletins combined livestock and crops into a number of different systems to illustrate how the work can be handled most efficiently.

A farm management tour will be conducted in Walker County in August. A tour of this kind was held in that county last year and aroused a great deal of interest in farm accounting.

V. C. Childs, of the class of 1922, who did some special work in farm management at the college of Georgia, and who has been assistant statistician for the U. S. Bureau of Crop Estimates, has recently been promoted to statistician and placed in charge of the Georgia office.

K. Treanor and D. L. Floyd, of the class of 1924, have been assigned to the Georgia office of the Bureau of Crop

Estimates for special training with the idea of fitting themselves for statistical work.

Professor C. E. Allred announces that five counties have recently been studied by the University of Tennessee in the series of economic, social and educational surveys of counties, which was recently begun by that institution. A bulletin on Union County has already been published and manuscripts on Crockett, Lewis and Picket Counties are now in preparation. A manuscript embodying the results of a less intensive study of Polk County has been completed.

The next meeting of the Southern Association of Economists and Sociologists is to be held at the University of Tennessee during October, 1924. The object of this association is to coordinate and stimulate the research work which is being done, with a view to the more rapid economic development of the Southern States. S. H. Hobbs, Jr., of University of North Carolina is President of the association and C. E. Allred of the University of Tennessee is Secretary.

A new project in farm organization was inaugurated this spring in Graves and five adjoining counties in Western Kentucky. Detailed cost accounts are being kept by 20 farmers and financial records by 75 farmers.

The production of cotton has been started over a considerable area of this territory during the past two years, replacing part or all of the acreage of dark fire-cured tobacco on many farms. Heretofore cotton has been an important crop in only one Kentucky County, Fulton, located at the extreme western point of the State on the Mississippi River. A determination of the economic place of the cotton crop in the farming system of the section is one of the important objects of the study. The Bureau of Agricultural Economics is cooperating with the College of Agriculture in the project.

In a farm organization study made in Mason and Fleming Counties at the Northern border of the Blue Grass Region, complete business analysis records for the farm year 1922 were secured from 241 farm operators. The average of the net earnings of these farmers was $1,031 of which $332

represented the value of perquisites furnished by the farm to the operator's family.

Mr. R. F. Taber, who received a master's degree at Harvard in June, has returned to his work as farm management demonstrator in Ohio.

During the week of May 19, a school for elevator managers was held at the Ohio State University. Instruction was given in grain and seed grading, accounting, and business practice. A profitable week was reported.

B. A. Wallace of the Ohio State University is just completing a study of the food supply of Lima, its amounts, quality, and place of origin.

There are now 678 members in the American Farm Economic Association.

Recently at Purdue 91 graduates of the regular four-year course in agriculture completed a minimum of $13\frac{1}{3}$ semester hours of farm management and general economics. These five courses cover the general principles of elementary economics, farm accounting, farm organization and marketing.

A more orderly sequence of these courses will be followed hereafter. Elementary economics will be available in the second semester of the sophomore year. It will accompany the farm accounting and precede farm organization and marketing.

Four master of science in agriculture degrees were conferred this June, to those majoring in farm management and minoring in economics. Those receiving degrees are F. R. Herr, R. H. Rogers, W. U. Rusk and H. A. Ward.

"Increasing Farm Earnings by the Use of Simple Farm Records" is the title of Bulletin 252 of the University of Illinois by H. C. M. Case and M. L. Mosher. This publication which is based on 7 years of records kept by farmers in Woodford County, Illinois, is planned to encourage record keeping on the part of farmers.

Mr. F. F. Elliott, M. S. Illinois, 1919, has completed a year of graduate study at each Harvard and Wisconsin and returns this fall to take up investigational and teaching work in farm management at Illinois.

Mr. B. F. Alvord, M. S. Illinois, 1924, has been appointed as agent in the U. S. D. A. and will have charge of field work in cooperative cost accounting studies in Knox and Warren Counties, Illinois. He takes the place of L. G. Hall resigned.

Dr. Kenyon L. Butterfield has resigned the presidency of Massachusetts Agricultural College to accept the same position at the Michigan Agricultural College. Dr. Butterfield will begin his new duties on September 1, 1924.

Mr. Hale Tennant has resigned as director of the markets department of the Michigan Agricultural College. This resignation will take effect January 1, 1925.

A bulletin on Potato Marketing in Michigan is being prepared by the Economics Department of the Agricultural College. This bulletin will be based upon the research work done by John T. Horner during the past year.

The Taylor-Hibbard Club of the University of Wisconsin completed a successful year with a social meeting May 30, attended by 45 students and faculty, with their wives and friends. A feature of the entertainment was a farce called "The Doctorial Factory" in which candidates for Ph. D. degrees in agricultural economics were put over the hurdles including such things as foreign language examinations, and the final oral examination.

Many members of the club are leaving to take up work in various parts of the United States. Ward W. Fetrow and J. T. Sanders have accepted positions with Oklahoma Agricultural College; F. F. Elliott will do research work at the University of Illinois; George F. Johnson will be with the State Department of Agriculture in Pennsylvania; R. E. Wakely will return to Pennsylvania; C. A. Wiley will be at the University of Texas, and C. G. Randell with the Producers' Commission Company at Chicago. Among the men

remaining for more graduate work are: O. M. Johnson, G. G. Devault, J. E. Lattimer, B. W. Allin, L. D. Howell, W. A. Hartman and F. L. Thomsen.

Dr. B. H. Hibbard, of the University of Wisconsin, was a speaker at the Semi-centennial Celebration of the Ontario Agricultural College, June 9-13. He spoke on the "Place of Economics in the Study of Agricultural Problems," and "Farm Movements in the United States."

Henry H. Bakken has been appointed assistant professor in marketing extension in the College of Agriculture, University of Wisconsin.

Mr. C. F. Clayton, of the division of agricultural economics, reported for duty on July 1, at the University of Arkansas, where he will do work in rural economics and rural sociology. On the same date, Mr. C. M. Arthur went to his new work as publicity man for the Minnesota Farm Bureau Federation.

Six new students at Minnesota took up graduate work in agricultural economics at the beginning of the spring quarter.

Minnesota Bulletin No. 209, "Cooperative Central Marketing Organization," by J. D. Black and H. B. Price will come from the press some time in July.

The new bulletin of the School of Business of the University of Minnesota announces a new freshman course, to be called "Introduction to Economics," under the direction of Professor J. D. Black. This is to be an approach course required of all pre-business students. This subject-matter of the course is economics of production and the general outline is much the same as that of the course in "Economics of Agricultural Production" given regularly on the Farm Campus.

Several farm management tours have been held in Minnesota within the month. Especial interest has been focused upon the management and value of sweet clover pastures.

On June 4, the fourth annual tour was held in connection with the farm cost routes maintained by the University of

Minnesota and the U. S. Bureau of Agricultural Economics in Steele County, Southeast Minnesota.

On June 11, a similar tour was held in connection with the Cottonwood-Jackson County route in Southeast Minnesota.

Beginning with April, the Minnesota farm management workers started the monthly publication of the monthly "pink sheet." The purpose is to give timely suggestions to extension workers and farmers based on cost record, and government reports.

"Some Uses of Farm Cost Accounts," Extension Circular 61, by T. S. Thorfinnson, Assistant State Agent in Farm Management, North Dakota Agricultural College, has just gone to the press. This circular deals with labor distribution as related to farm organization and shows from actual farm records the relationship of costs to different systems of organization. The conclusion is that on most farms livestock and the accompanying production of feeds as supplementary enterprises to grain, is the most economic type of organization under the present conditions.

Four men received the master of science degree in Agricultural Economics at the North Dakota Agricultural College in June as follows: Ronald C. Bentley, Orville Fuller, K. W. Greene, and H. E. Kjorlie.

Half of the agricultural group at North Dakota are receiving the bachelor of science degree in agricultural economics, there being eight men who specialized in the economic phase of agriculture.

The Department of Farm Economics of the South Dakota College of Agriculture has recently completed the field work of its third annual farm management survey of Jones County, South Dakota, and is now engaged in tabulating the results.

Field work on the third year of two other surveys, one of the Great Plains Region and the other of the Spring Wheat Region is just being started, and will last into July.

The Department has, during the past year, added to the courses offered, statistics, agricultural prices, public finance,

cooperative management and accounting methods for cooperative associations, and has increased the amount of work offered in farm management. Plans for next year include strengthening of the course in Agricultural Economics, by giving it for an additional quarter.

Mr. W. H. Youngman, research assistant at Iowa State College resigned June 1 and is now instructing at Texas Agricultural College. Mr. Millard Peck of the department of economics and history has succeeded Mr. Youngman at Iowa State College.

The Iowa State College chapter of the American Farm Economic Association is holding bi-weekly luncheons.

The Iowa Agricultural Experiment Station is undertaking an intensive study of loans and discounts of country banks in Iowa for the last 10 years. This investigation is being made under the direction of Dr. C. L. Holmes and Assistant Professor Fred Garlock.

The Agricultural Economics and Farm Management Section of Iowa State College is launching a combined organization and cost study in Bremer and Fayette Counties, a dairy section.

The department of agricultural economics of the Kansas State Agricultural Experiment Station, has a bulletin in preparation entitled, "Shortage of Farm Storage Space and Inability to Get Local Bank Credit as Factors Forcing an Early Marketing of Wheat." This bulletin summarizes a three years' study of the quantities of wheat sold in different localities before the farmers wanted to sell, the selling being caused by either shortage of storage or lack of local bank credit.

The Kansas State Agricultural College is further developing its marketing work by employing a man in livestock marketing beginning July 1. Grain marketing investigations have been under way since September, 1920.

The farm account clubs in Kansas organized by the farm management demonstrator, Mr. I. N. Chapman, are using notes on current production and marketing situations as a

basis for round table discussions at their regular monthly meetings. These notes are prepared by the department of agricultural economics of the college, and are sent out in mimeographed form a few days before the time for the meetings.

A course in the economics of grain marketing is being offered by the department of agricultural economics at the Kansas State Agricultural College. This is largely a problem course following an introductory course in the principles of marketing farm products.

A summary of 14,066 protein tests of wheat covering 103 counties, and extending over the 7 crop years, 1917-18 to 1923-24, inclusive, constitutes a part of the wheat marketing work recently completed by the department of agricultural economics, of the Kansas Experiment Station. These data were secured from large mill laboratories within the State.

The department of agricultural economics of the Kansas State Agricultural Experiment Station has recently completed one year's study of wheat shrinkage, loss and damage in farm storage. The study was conducted in important combine-harvester territory. Sixty-nine samples of wheat of about 7,000 grams each, were weighed into 27 bins at the time the wheat was binned. They were weighed out when the farmers sold their wheat.

The department of agricultural economics of the Kansas State Agricultural Experiment Station, in cooperation with the Federal Bureau of Agricultural Economics, has completed a three-year study of the cost of producing beef on grass in the Flint Hills Region of Kansas. The results are being summarized for publication.

A study of equalization and assessment of farm and city real estate in Kansas is nearing completion, as a part of the work in Land Problems and Taxation in the department of agricultural economics of the Kansas Agricultural Experiment Station. It includes a comparison of the ratio of assessed valuation to sale price of the large parcels of real estate as compared with small parcels; the amount of excess taxes placed upon certain parcels of real estate because of over assessment; the probable effect of unequal assessment

on farm and home ownership, on size of farms, and on city planning. It also includes measurements of progress in equalization during the last ten years and measurements of the relative importance of various types of inequalities.

The forthcoming report of this investigation will point out the probable causes of the major departures from the intent of the law in assessment and equalization, and a program will be suggested for remedying the existing defects in the valuation of real estate for taxation. It is a part of a general program of tax reform, which has as its principal object a reduction of the tax burden on real estate and other tangible property by finding new sources of revenue to supplement property taxes. The present system of taxation was designed to meet the needs of the State 50 years ago, but now it causes a disproportionate share of the tax burden to fall on owners of tangible property. In this connection it is interesting to note that delinquent taxes on farm real estate in the Wheat Belt of Kansas increased 470 per cent from 1917 to 1922.

Other phases of research in taxation aim to determine to what extent each public function is responsible for the increase in the real estate tax.

Colorado is developing a State program in connection with its agricultural industry. Several of the more important features of this program will be considered at the coming Farmers' Congress which will assemble July 14 to 18, 1924. Some of the topics which will receive attention are: (1) adapting production to market requirements, (2) marketing crops through livestock, (3) orderly marketing, (4) standardization and grading, (5) farm financing.

The National Child Welfare Bureau is cooperating with the department of economics and sociology of the Colorado Agricultural College in a survey of the child labor problem, particularly in the more important agricultural areas in Colorado. Records are being taken at the present time in the vicinity of Windsor and Greeley, Weld County, Colorado.

Mr. H. B. Pingrey, a graduate of the Colorado Agricultural College, has been appointed as agent in the Bureau of Agricultural Economics and will act in the capacity of route man in developing the cooperative farm accounting project in the Greeley area. Mr. Pingrey succeeds Mr. George Knutson whose appointment as agriculturist for the Union Pacific Railway was noted in the April issue of the Journal.

Mr. True D. Morse, B. S. in agriculture, University of Missouri, 1924, has been appointed extension specialist in marketing. He began his work June 1. Mr. Morse has had several years experience in extension work with livestock shipping associations. In his undergraduate work he specialized in marketing and economics at the University of Missouri.

Mr. W. L. Witte, Assistant Professor of Rural Sociology in the University of Missouri, has left the College and gone to his farm near Madison, Wisconsin.

During the month of May a party of six men under the direction of Mr. M. R. Cooper of the Bureau of Agricultural Economics and assisted by A. D. McNair, farm management specialist for Arkansas, made an investigation into the cost of producing cotton in Arkansas for the crop of 1923. The areas selected were at Conway, Faulkner County, and at Mariana, Lee County. Fifty farms were studied in each area.

In the work of household accounting in Arkansas in 1923, 92 housewives completed the work for the year. Seventy-eight of these were white and 14 colored.

The expenses were classified as food, clothing, house-furnishings, working equipment, recreation, education, benevolence, health, other running expenses and miscellaneous. The average amount spent by 78 white families was $415 of which one-third was for food and 28 per cent for clothing. The average amount spent by the 14 colored families was $273.00 of which 36 per cent was for food and 30 per cent for clothing. The white families averaged 5.2 persons per family and the colored families 6.25 persons.

M. E. Andrews, Professor of Agricultural Economics in the Oklahoma A. & M. College, has been granted a leave of absence to work for his Doctors degree in the University of Wisconsin. He will be replaced by J. T. Sanders, formerly of the Division of Land Economics of the U. S. Department of Agriculture, who will receive his Doctor's degree at the University of Wisconsin this summer. An addition to the department will be W. W. Fetrow as Associate Professor. Mr. Fetrow received his Doctor's degree from the University of Wisconsin in June.

The following members of the agricultural economics staff of Texas A. & M. College are away this summer for work leading to the Doctor's degree:

T. W. Leland, Associate Professor of Agricultural Economics, is attending the Graduate School of Business Administration at the University of Chicago.

C. M. Purves, Instructor in Agricultural Economics, is giving special attention to advanced statistical work at the University of Minnesota.

J. C. Butler, Instructor in Agricultural Economics, is completing his master's work in the School of Business Administration at the University of Texas.

W. H. Youngman, who recently completed the work for the master's degree at Iowa State College has been added to the staff of the Department of Agricultural Economics to take the place of P. K. Whelpton, resigned.

The Federal Crop Reporting service celebrated its sixty-first birthday last May. From a small beginning, the organization has been developed until now there are over 300,000 voluntary crop reporters, 60 State statisticians, 8-10 crop specialists, and 120 statistical clerks. Approximately 50,000 separate and distinct estimates of various kinds are issued annually.

Semi-monthly reports as to condition, progress, and probable production of cotton are to be issued by the Bureau of Agricultural Economics, U. S. Department of Agriculture, between July 1 and December 1. This is a new feature of the crop reporting service.

NEW MEMBERS, APRIL 1—JULY 1, 1924

Arner, G. B. L.—Bureau of Agri. Economics, Washington, D. C.
Belting, C. H.—Aledo, Illinois.
Bjoika, Kunte—Iowa State College, Ames, Iowa.
Blackwell, C. P.—Box 388, Clemson College, South Carolina.
Bruington, Earl V.—Brookside Farm, Cameron, Illinois.
Carson, Wm. J.—Division of Research & Statistics, Federal Reserve Board, Washington, D. C.
Carter, D. J.—Dairymen's News—New York City.
Champlin, A. E.—Alfred, New York.
Clemen, Rudolf A.—Ill. Merchants Bank, 230 S. Clark St., Chicago, Illinois.
Condliffe, J. B.—Canterbury College, Christchurch, New Zealand.
Crittenden, L. W.—School of Agriculture, Cobleskill, N. Y.
Agricultural Editor—Auburn, Alabama.
The Editor—Die Landbouweekblad, P. O. Box 267, Bloemfontein, South Africa.
Graves, Lloyd M.—Howard-Moorhouse, Inc.—58 E. Washington St., Chicago, Illinois.
Haas, Geo. C.—Bureau of Agri. Economics, Wash., D. C.
Herr, Frank R.—Rural Route No. 7, Crawfordsville, Indiana.
Hoffer, C. R.—The University of Minnesota, Minneapolis, Minnesota.
Holmberg, N. J.—Commissioner of Agriculture, State Capitol, St. Paul, Minnesota.
Howard-Moorhouse, Inc.—58 E. Washington St., Chicago, Illinois.
Hubbard, W. S.—International Harvester Co., 606 S. Michigan Ave., Chicago, Illinois.
Johnson, Thew D.—Bureau of Agri. Econ., Washington, D. C.
Jones, Bruce P.—Hall, New York.
Kimura, S.—Utsunomiya Kotonorin, Gakko, Japan.
Knapp, H. B.—State Agri. School, Farmingdale, Long Island, New York.
Leslie, Roland R.—Box 1394, Brawley, California.
Mitchell, Wesley C.—161 West 12th Street, New York City.
Okuda, Iku—Mananari—Tobishima—Mura Ama—Gun Aichi—Ken, Japan.
Ousley, Clarence—Federal International Banking Co., New Orleans, Louisiana.
Powell, W. W.—American Ass'n of Joint Land Bank, 320-324 Kellogg Building, Wash., D. C.
Powers, G. H.—Springport, Indiana.
The Principal—Imperial College of Tropical Agriculture, St. Augustine, Trinidad, West Indies.
Pugsley, C. W.—South Dakota State College of Agri. and Mechanic Arts, Brookings, S. Dakota.
Ross, R. C.—University of Ill. College of Agri. Experiment Station, Urbana, Illinois.
Rule, O. R.—Federal Fruit and Vegetable Growers, Inc., 90 West St., New York.
Rusk, Walter U.—312 Fowler Ave., West Lafayette, Indiana.
Schmidt, Louis—Iowa State College, Ames, Iowa.
Seager, Henry R.—Columbia University, New York City.
Sniffen, C. E.—120 W. 42nd St., New York City.

Southern Fertilizer Asso.---P. O. Box 926, Atlanta, Georgia.
Stewart, Carl R.---Monmouth, Illinois.
Taber, L. J.---970 College Ave., Columbus, Ohio.
Walrath, Edgar K.---University of Maryland, College Park, Maryland.
Ward, H. A.---720 Evergreen St., W. Lafayette, Indiana.
Whisenand, J. W.---Henry Co. Farm Bureau, Cambridge, Ill.
Mass. Department of Agriculture ---136 State House, Boston, Massachusetts.
Library ---Oklahoma Agricultural and Mechanical College, Stillwater, Oklahoma.
John Tarleton Agricultural College ---% J. Thomas Davis, Stephenville, Texas.
The University of Vermont--Burlington, Vermont.
University of Hawaii---Honolulu, Territory of Hawaii, Hawaii.
Allmanna Tidningskontoret-A-B Gust-Ad-Torg-Stockholm, Sweden.

ASSOCIATE MEMBERS

Allen, B. G.---Pocahontas, Iowa.
Koch, L. C.---Varna, Illinois.
Sibley, Elba---Bee Creek, Illinois.
Steele, J. A.---Room 312—Agricultural Hall, Iowa State College, Ames, Iowa.
Wilson, T. H.---Woodstock, Illinois.